Oliver Grimm (ed.)

Beast and Human

Case Studies for Northern Europe from Prehistoric to Early Modern Times

LEIBNIZ-ZENTRUM
FÜR ARCHÄOLOGIE

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Case Studies for Northern Europe from Prehistoric to Early Modern Times

Papers from a Session at the Annual Meeting
of the European Association of Archaeologists
Kiel, September 2021

LEIBNIZ-ZENTRUM
FÜR ARCHÄOLOGIE

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Preface

Human-Animal Studies are gaining more and more momentum in archaeo(zoo)logy for good reasons - it is time to have yet another look at animal-human relations that is less anthropocentric than it was before. Such an approach could come in different forms: from the study of single species and their relation to humans to a so-called multispecies archaeology. However, it could also include imaginary animals, such as dragons and unicorns, or half-animal, half-human beings. The present book is on the one hand to be understood as a small contribution to Human-Animal Studies in archaeo(zoo)logy - and on the other also as a first step towards a multispecies archaeology, being a broader look on different species, non-human and human-animal, but, for the time being, excluding plants.

With some alterations and additions, the publication basically goes back to a digital session at the Annual Meeting of the European Association of Archaeologists (EAA) in Kiel (Germany) in September 2021, entitled »Beast and Human«. I am very grateful to my session co-organisers Dr. Ekaterina Kashina from the State Historical Museum in Moscow (Russia), Dr. Tuija Kirkinen from Helsinki University (Finland), Prof. Hannah O'Regan from Nottingham University (United Kingdom) and, finally, Associate Professor Giedrė Piličiauskienė from Vilnius University (Lithuania). It was the five of us who collaborated on the shaping and handling of the EAA session and who still remain in contact.

For various reasons, the present book is now, regretfully, solely edited by me. However, the EAA session as such, with its colourful and diverse set of contributions, is worth publishing. As it has turned out, the papers can be arranged in such a manner that they constitute a narrative which ranges, geographically, from the United Kingdom to Russia and, chronologically, from the Late Palaeolithic to Early Modern Times.

The book's narrative fits in with the ongoing long-term research program on Human-Animal Studies, which was started in 2010 by my dear colleague PD Dr. habil. Ulrich Schmölcke and myself at the then Centre for Baltic and Scandinavian Archaeology (ZBSA) in Schleswig, northern Germany. Due to its integration into the Leibniz-Centre for Archaeology (LEIZA, with its main seat in Mainz) in 2024, the ZBSA ceased to exist as an institute, but research is continued in Schleswig. That work has always included - and continues to do so - publishing articles and monographs as the outcome of personal research, as well as the organization of conferences, some of which have resulted in the extended proceedings »Hunting in Northern Europe until 1500 AD« (2013), »Raptor and Human« (2018), »Raptor on the Fist« (2020) and »Bear and Human« (2023), while research on »Exotic Animal and Human« is still ongoing. These books also have a bearing on the articles in the present publication.

The gathered texts have gone through a peer review and a close copy-editing. Reviewing was done by the editor and, additionally, from among the book authors or externally. This excludes the editor's text that serves as introduction, discussion and synthesis. I am grateful for the help I had in the reviewing process, and it is most welcome that both print and digital versions (Open Access Gold) of the book will be available.

Book production always involves different parties, which shall not be forgotten. I would like to thank all the authors for providing such substantial texts and for being so patient in the long process of creating the book. As for many years now, there was precious help by dear colleagues in Schleswig with whom it is a pleasure to work: copy-editor Dr. Gundula Lidke and graphic editor Matthias Bolte. The cover layout was created by Nicole Viehöver (LEIZA, MONREPOS | Archäologisches

Forschungszentrum und Museum für menschliche Verhaltensevolution, Neuwied) and, as for many years now, Sharon Shellock (United Kingdom) carried out the language proof-reading of the texts. Thanks to all! Finally, Dr. Rosie Bonté (Brepols Publishers, Belgium) came up with the idea for a book based on the EAA session. Without her, there would be no such book. This is well-remembered.

Enjoy the publication!

Oliver Grimm
Schleswig, May 2025

Oliver Grimm

Beast and Human – Introduction, Discussion and Synthesis

Human-Animal Studies began to take shape in the wake of the animal rights movement of the 1970s. Subsequently, in the late 1980s, it was established as an academic discipline in its own right, as a branch of the Humanities that endeavours to consider the animal-human relationship in a less anthropocentric way than before, by granting agency to the animal (Kompatscher et al. 2017; DeMello 2021; Roscher et al. 2021). However, it was only introduced into archaeo-(zoo)logy considerably later, as »Social Zooarchaeology« (groundbreaking: Russell 2012 and Overton/Hamilakis 2013, but see also Mannermaa 2013 with a critical view on the latter contribution). Yet another approach is through Posthumanism in archaeology (Fernández-Götz et al. 2021; see also Fredengren 2013; 2021; Jennbert 2021).

Human-Animal Studies continue to gain more and more momentum in archaeo(zoo)logy, but there is still considerable potential for studies that cover longer periods, such as from the Stone Age and onwards, or for pioneer work on restricted periods. In this respect, it is worth a mention that the Iron Age of northern Europe has much to offer in the form of hundreds of burials with animal remains, mostly from bear, dog and raptor, although Neolithic cattle depositions (burials) will not be overlooked (more on this below).

For a period of almost 15 years (2010–2023), research into the archaeology and history of hunting and, increasingly, Human-Animal Studies was carried out by scholars at the Centre for Baltic and Scandinavian Archaeology (ZBSA, Schleswig, Germany), of which I was part (due to its integration into the LEIZA [Leibniz-Zentrum für Archäologie/Leibniz-Centre for Archaeology with its main seat in Mainz, Germany] this Centre no longer exists, but research continues in Schleswig within the LEIZA). The work took different forms, from articles and books as the outcome of personal research to the realising of conferences and their proceedings. Particular cases have been the much extended conference proceedings that transcend time, region and academic branch: »Hunting in Northern Europe« (Grimm/Schmölcke 2013), »Raptor and Human« (Gersmann/Grimm 2018), »Raptor on the Fist« (Grimm 2020a), and »Bear and Human« (Grimm 2023a). These books will also have a bearing on some of the following articles on dogs, raptors/falconry and bears.

With some alterations and additions, the present publication goes back to a session at the Annual Meeting of the European Association of Archaeologists (EAA) in Kiel (Germany) in September 2021, conducted online, entitled »Beast and Human«. It should be noted that »beast« is a general term that can be used to describe both wild and domesticated animals, but in the present book it will primarily refer to wild animals. Interestingly, our book has a precedent, at least to some extent, in the proceedings of a conference in 2011 on »Representing Beasts in Early Medieval England and Scandinavia« (Bintley/Williams 2015). We will return to this.

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Structure

The texts in the book belong to two main sections.

The first three contributions approach *methodological issues* and are about matters of identification:

- natural sciences: wolf vs. dog and bear claw vs. bear skin,
- posthumanism: cattle vs. aurochs.

The other nine contributions, which are in fact *case studies*, have been ascribed to the following subchapters:

- hunter, huntress and animal hunting assistants (dogs and raptors in medieval and early modern Lithuania) as the human's close companions,
- bears as animal agents, symbols and prey (Russian material for the Stone and Bronze Ages, also with references to more western parts of Europe; burials with bear claws in England/northern Germany and the Sambian Peninsula in the middle of the 1st millennium AD),
- animal symbolism, from snake and duck (Belarus, from the Stone Age to medieval times) to »dragon« and hare (Estonia's Late Iron Age),
- further consideration: wild animals of the North Pontic region (»Sarmatia«) and raptors of Asia (Early Bronze Age).

Material

The materials used in the articles are archaeo(zoo)logical. The papers on medieval and early modern Lithuania, however, not only draw upon a rich source of osteological information but also high quality written records. In the following, the contributions are discussed in a broader archaeo(zoo)logical manner in an attempt to create a narrative based on the given papers. From to time to time, other materials are taken into account (visual, non-archaeological), and a look at the biology of the animals (raptors, snakes) and practical aspects (falconry as seen by the practitioner, thus transdisciplinarily) contribute to this, too. This will lead to insights that cannot be gained from archaeo(zoo)logy alone.

Method

Three contributions about matters of animal identification in both the Natural Sciences and the Humanities address methodological issues, which is necessary in order to provide solid ground for further reflection.

Natural Sciences: Dog vs. Wolf and Bear Skin vs. Bear Claw

Where are the wolves? The wolf enigma – its absence in archaeozoological records – has been considered in a paper by the influential scholar A. Pluskowski, who looked at medieval archaeological contexts almost 20 years ago, but this kind of rarity is also the case for earlier times (Pluskowski 2006). Among other things, this paper explores the morphological relationship between wolves and dogs, including the issue of hybridisation and suggests, using a mixture of archaeo(zoo)logical and historical sources, that the scarcity of wolf remains may in fact reflect infrequent hunting.

Now, almost 20 years later, in this volume, **Luc August Adèle Janssens** looks at research on the wolf/dog differentiation in the natural sciences over the past years. In comparison to wolves, it was usually presumed that dogs are characterised, *inter alia*, by their smaller size and wider snout. Recently, genetics have become increasingly important alongside computerised Geometric Morphometrics, while Classical Morphology has seen a revival. Based on these different strands of research, many previously assumed differences between wolf and dog can be rejected, but elements such as size, snout width and height continue to be of importance. It is probably too early to recognise if the wolf enigma can be solved this way. However, the past two decades have seen a growing number of identified wolf remains in medieval archaeological contexts (personal communication on June 23rd 2025 with Aleks Pluskowski, who has a paper on this in preparation). This increase in knowledge may have an influence on the hotly debated topic of wolf-domestication, too (see e. g. Sykes 2018).

We also owe a re-analysis of the famous dog from Oberkassel (Bonn, Germany) to Luc August Adèle Janssens (Janssens et al. 2018). More than 100 years ago, human and animal bones came to light there during quarrying, and it is argued that the remains

of a dog and two humans (male and female) were found so close to each other that they constitute one burial, dated to around 14,000 years ago and once stained with ochre (Street et al. 2015). The dog remains, which differ from wolf to a considerable extent and consist of forelimbs, vertebrae and skull and rib bones, are special: The pathology of the dog, in fact a late juvenile of 27–28 weeks of age, suggests that it died young of a severe illness (canine distemper), during which it had to be taken care of and fed, which seems to indicate a close bond between human and dog. Remarkably, the most recent re-analysis of the bone material from Oberkassel revealed the tooth of another, older and smaller dog (Janssens et al. 2018).

The dog-human relationship has been characterised as multi-layered (see e. g. Petersen 2013; Schmölcke 2013). This dog was not just a mere »hunting assistant« (if it really was one), but a human's close companion, if not »soul mate«. However, there is an issue: one cannot reliably identify hunting dogs on the basis of (partial) skeletons alone, although the build of the animal in question may give a hint (see below). One thing is apparent: the association of dogs with richly furnished burials at some points in the Iron Age (still fundamental: Prummel 1992). We can see this all over Scandinavia, such as in the »royal« Viking Age Ladby ship in Denmark (Holm Sørensen 2013), the likewise »royal« and contemporary burial in Gokstad in Norway (Gansum 2018) and the richly furnished Late Iron Age boat-graves of Valsgärde, central Sweden (Nichols 2021).

Besides the wolf/dog enigma, the bear skin/bear claw question may also benefit from intensified research by the natural sciences. Recently, this bear claw/bear skin controversy has increased, with claws being identified as the remnants of former skins (see e. g. Beermann 2016). It is the point of view of **Tuija Kirkinen** and **Oliver Grimm** in the present book that there is a difference in evidential value between claws and skins in burials (see also Grimm 2013; 2023b). In the case of the former, which are usually found in cremation burials, it is very possible that the deceased was placed on a skin on the funeral pyre and that, as a rule, only one or a few claws made their way into the actual burial, but there is no way to prove this. In contrast, assumed or actual skin, mostly found in inhumation burials, seems to provide undoubted proof. But also for those cases, a very close look is needed; how substantial are the skin remains? Is it really skin with the claws still attached or rather claws with small remnants of skin? As analysis shows, there are a number of factual »bear skin burials« in Norway, Sweden and Finland, often connected to burials beyond the ordinary (more on this below).

The novelty in the analysis of »bear skin burials« is the use of the microscope by which animal hairs can also, quite successfully, be detected (see Kirkinen et al. 2020a; 2020b). The present paper may also be seen as a call for action to try a re-analysis by microscope of skin remains from burials that still exist in museum archives. The Migration Period chamber grave from Högom (Medelpad, northern Sweden), which was excavated indoors under laboratory conditions after it had been encased on location, has brought to light an amazing collection of fur/hair, owing to the excellent preservation conditions of the burial and the use of the microscope; apart from bear, reindeer/roe deer, beaver, marten, sable, polecat and pinniped/musquash fur and hair have also been found (!) (Nockert 1991, 31).

Posthumanism: Cattle vs. Aurochs

As already stated, an alternative perspective on the animal-human-relationship, as opposed to a purely utilitarian, anthropocentric view, was already advocated in a broad sense decades ago, post-1968, in the Humanities. This was influenced by the Animal Rights Movement in the wake of calls for a new approach to life (Kompatscher et al. 2017; DeMello 2021; Roscher et al. 2021). It took decades, however, for this approach to find its way into archaeo(zoo)logy, at least openly expressed, and it comes in different variations. One of these is labelled Posthumanism, as **Emily Banfield** sketches in her paper, with a reference to the French philosopher J. Derrida's influential book »The Animal That Therefore I Am« (2008; French original edition 2006) (on Posthumanism and archaeology see also Fredengren 2013; 2021; Fernández-Götz et al. 2021; Jennbert 2021). As Banfield puts it, studies to that effect in archaeology have predominantly looked at wild species and early domestication, but her angle is different.

She draws attention to Woodford G2, a long barrow on Salisbury Plain, five kilometres south of Stonehenge. Excavation uncovered a flint cairn at the core of the mound; its other and later elements will be disregarded here. Eighty-six disarticulated human bones were found in the cairn, which belong to a minimum of three individuals, with a ^{14}C dating to the Early Neolithic (3427–3370 cal BC; 68.2 % probability). Also, a low number of fragments of seemingly residual sheep/goat remains and pottery sherds were found. The cairn consisted of unstruck flint nodules, with cattle teeth and pedal bones

placed close to its upper edge. Remarkably, at least one of the cattle bones belongs to a male aurochs (!), the wild progenitor species that was present in Britain before domesticated cattle were introduced. Unless the bone is from an aurochs that died of natural causes, hunting must be taken as given.

A large-scale study on Stone Age big-game hunting remains to be written, as it may seem. However, communal reindeer hunting with bow and arrow, using bottle-necks during the animals' annual migration, is well-documented. These were natural bottlenecks, such as at the lake in the Late Palaeolithic Ahrensburger Tunneltal (tunnel valley) in northern Germany (e. g. Weber 2013), but there were also artificial ones, created by stone alignments in parts of Norway, yet with a much broader dating (e. g. Indrelid 2013). Trapping by stone constructions, likewise used over long periods, is recorded for Norway, too (Bang Andersen 2013). Furthermore, it has been suggested that the hunting of reindeer and elk in the Mesolithic Maglemose Period in Denmark took place in water into which the animals had been driven and which left them vulnerable to attack, first by the use of large-barbed harpoons in order to immobilise them, followed by the use of other weapons for the deadly blow (Petersen 2005). Any further elaboration has to be omitted here, but the other end of the time scale in the present book is represented by the prestige (royal) hunting of large game in late medieval/early modern Vilnius Lower Castle (more on this below).

It has been suggested for Woodford that the humans in the flint cairn were deliberately placed beneath a cattle hide, which may suggest an embrace or protection of the human by the animal. This, however, is only true if one takes as given a sequence of actions – arrangement of the human burials and placement of the animal hide – with no intermission. This would have reflected a close contact between both species, with humans benefitting daily from the increased dairy products. Among the cattle, there was at least one with a high age whose biography could point towards a long relationship with humans who recognised it as an individual. It is yet another assumption that the flint cairn with human remains was enveloped by an aurochs-cattle composite hide, and while the cattle signalled protection, the aurochs bull introduced the idea of power and ferocity.

Repeatedly, cattle remains, especially the skull and pedal bones (often associated with human burials), have been reported for the advanced Neolithic of the British Isles, and this phenomenon, called »head and hooves«, may indicate former, now decomposed hides (see Piggott 1962). Another interesting Late Neolithic find originates from a barrow in Irthlingborough (Northamptonshire, East Midlands), with a deceased human placed in the large central pit of the barrow and the incredible number of 185 cattle skulls found on top, all from domesticated animals, though again one is from an aurochs, with a dating of 2500–2200/2100 BC (Davis/Payne 1993).

Ultimately, Woodford and the other sites in England should be related to the custom of »cattle depositions« more broadly, be it in Kilshane, Ireland, with a dating to the late 4th millennium BC (Piegière et al. 2021), or the Middle and Final Neolithic sites (3800–2200 BC) in the north of Denmark, central Poland, and the Carpathian Basin as well as the Middle-Elbe-Saale-region and adjacent areas (Hartmann in print).

Case Studies

Dogs and Raptors

Two papers in this book, one on hunting dogs and hunting with dogs by **Giedrė Piličiauskienė** (lead author), and one on raptors/falconry by **Aurelija Zagurskytė** (lead author), take into account archaeo-(zoo)logical and historical material from the Grand Duchy of Lithuania in the period from the 13th to the 17th centuries, during which Władysław II Jagiełło (ruled 1386–1434) and his successors were kings of Poland as well as Lithuanian dukes. We will return to this duke/king and his hunting. The Grand Duchy is well known from written records but also from the excavations at Vilnius Lower Castle, the third and final phase of which (16th and first half of the 17th century) represents the actual royal palace. Excavations at this castle have been ongoing for decades and up until recently. This is also where most of the analysed bird (raptor) and dog bones come from. As a matter of fact, no less than 80,000 animal bones have come to light during the investigations. With the main finds at Vilnius Lower Castle supplemented by a few from other sites, there is a minimum number of 51 dogs and more than 1300 (!) birds, including at least 29 raptors: goshawk and sparrowhawk, but also small falcon and white tailed/golden eagle.

As for the dogs, one has to face the methodological problem that those with the same morphotype

might have seen different uses (in the following, after Giedrė Piličiauskienė and others in the present volume). An identification of hunting dogs is thus problematic, but the find context, such as in Vilnius Lower Castle within its Duchy, could strengthen any such assumption. Interestingly, a sighthound-like dog from there (74 cm high, with gracile build, and a narrow and long skull), which has been radiocarbon-dated to the 14th century, yields high isotope values indicative of an exceptional diet that consisted of meat and/or fish. Such animals were in the hands of professional dog keepers, mentioned for later times in written records. Quite remarkably, dogs of a comparable build are well known from wealthy Late Iron Age burials in northern Europe (see above).

Another important aspect is the great diversity of dogs at Vilnius Lower Castle, ranging from small (lapdogs) to tall and slender (sighthound-like) and further to large (Molossians and Spitz-type); this kind of diversity can also be taken as an indication for an upper(most) social milieu. Again, however, it is the written sources that offer much more insight. For the 16th century and onwards, more than ten different kinds of dogs are mentioned for Lithuania, including hunting dogs distinguished by the type of their game (bear, bison, deer, and so on), or the type of hunting (with birds of prey in falconry).

When it comes to the interpretation of the raptors from Vilnius Lower Castle, we have to point to falconry, which is defined by the practitioners from the IAF (International Association for Falconry and Conservation of Birds of Prey; www.iaf.org), as »the taking of quarry in its natural state and habitat by means of trained birds of prey«. At the core of falconry, there is the raptor-human relationship (»comradeship«) between a non-domesticated/non-domesticable bird that distances itself from humans by nature and a human who wants to spend time with the bird, fascinated by its personality, aerial manoeuvres and hunting (Bednarek 2018; Richter 2018). This bird is a »companion« (see here the use of the word by the influential thinker, Donna Haraway [2003]). Falconry is the day-to-day care of the bird; hunting is only a part of it. Notably, the falconer says that the bird goes hunting with the human and not the other way around, and each time nature takes its course between the hunting bird and its possible prey the falconer is both thrilled and concerned, in fear that the bird may not return.

Falconry was once practised on one stretch of land that reached from Europe and northern Africa in the west to Japan in the east, and it has left a multitude of materials with an ascertained minimum age of 2,000 years (Gersmann/Grimm 2018; Grimm 2020). Historically, in many areas, falconry was a badge of rank for royalty and the nobility, and its status is most prominently associated with the Holy Roman Emperor Frederick II (1194–1250). Not only did he write a famous book on falconry (»De arte venandi cum avibus«) in the early 1240s, after decades of experience with raptors and hunting with trained birds (Giese 2018), but falconry was also part of state philosophy in his time: it was thought that only the patient ruler – as patient as the falconer – is a good ruler (Boccassini 2018). Notably, falconers were practitioners who also took daily care of the birds; once the bird had been trained it could be placed on the fist of the king or queen who wished to hunt (Richter 2018, 56).

As far as Lithuania is concerned, with its dense forests in the given time period, goshawk and sparrowhawk, which live and hunt in forests, would have been the birds of choice, although this is not fully in line with the osteological record that also shows falcons, though small ones. In turn, eagles – specifically golden eagles – played no role in premodern European falconry (in the following, after Aurelija Zagurskyte and others in the present volume; see also Richter 2018 on European falconry more broadly). Female birds, which are bigger than their male counterparts, would have been preferred; however, the sexing of the birds has only been possible in a few cases, which are mainly from Vilnius Lower Castle, and there is no clear dominance of females. As we know, just-fledged raptors were taken out of nests or young birds were captured and then properly trained for hunting. According to written records, raptors used in falconry were highly praised and priced in Lithuania, and they served as diplomatic gifts which, incidentally, was also the case for dogs (see Giedrė Piličiauskienė and others, this volume).

The salvaged material from Lithuania and in particular from Vilnius Lower Castle is notable in that at least 29 raptors were found in a settlement archaeological context, the number alone of which is otherwise unknown in Europe, except for the West Slavonic late 1st-millennium-AD seat of power in Starigard-Oldenburg (northern Germany) with 41 such birds (Grimm 2018; see also Bleile 2018; Teegen 2018). Also, the preservation of hoods at Vilnius Castle is extraordinary, owing to favourable conditions. Such hoods were typically used for falcons, and Emperor Frederick II (1194–1250) mentions that he had them brought from Arabia in the first part of the 13th century (Giese 2018, 1461). Accordingly, hoods that have so far been found in Norway and Russia are post-1250 (Orten Lie 2018; Zinoviev 2018), as are those from the Great Duchy of Lithuania.

In the present context of raptors and dogs in the Grand Duchy of Lithuania, sources other than ar-

chaeo(zoo)logy have considerable evidential value (see here Aurelija Zagurskyte and others and Giedrė Piličiauskienė and others in the present volume). Wigand of Marburg, chronicler of the Teutonic Order, states for late 14th century Lithuania that when the Grand Duke Kęstutis, a second generation duke in the period of Lithuanian growth, was cremated, hunting dogs and hunting birds were among the furnishings.

The aforementioned duke of Lithuania and king of Poland, Władysław II Jagiełło (ruled 1386–1434), also deserves a mention in this respect. As recorded, he had 100 hunting dogs and 40 hunting birds at his disposal, which were surely in the hands of professional animal keepers, who took daily care of them. His tomb in Cracow is among the most outstanding examples of European sepulchral art (Chrubasik 2018), and the dogs and birds of prey that are found on the plinth of the tomb are unique, which raises the question of whether the king, most certainly an ardent hunter in his lifetime, was depicted as such on his tomb. However, he had just adopted Christianity, which is why any reference to hunting on his tomb was completely out of the question. It must therefore be assumed that these animals had other meanings. The birds may represent eagles and could thus be understood in a heraldic context as representative of the kingdom as well as the Cracow territory. Władysław II Jagiełło was surely also a representative of the classical period of royal hunting which, until the mid-15th century, was considered to be a school for the nobility to learn warfare, achieve greatness and become accustomed to the wilderness (see Giedrė Piličiauskienė and others, Aurelija Zagurskyte and others, this volume). From the 15th century onwards, however, royal hunting increasingly decayed and finally took the form of animals just being driven in front of guns.

Exceptional women of the Grand Duchy of Lithuania are described as participants in hunting, such as the Italian princess, Bona Sforza (1494–1557), who was the mother of the Duke of Lithuania and King of Poland, Sigismund II Augustus (1520–1572), and the Lithuanian noble woman, Barbara Radziwiłł (1520–1551), the second wife of Sigismund (see Aurelija Zagurskyte and others, this volume). This is not as surprising as it may seem. Mary, Duchess of Burgundy (1457–1482), is the best documented medieval female hunter/falconer in Europe, in both pictorial and written form (Karakova-Hesry 2020), but there is a trail to much earlier times. The burial in question was robbed, but a wealthy female buried in Quedlinburg in east Germany, roughly 1500 years ago, had obtained a goshawk – a female one, whose skull is preserved, which is a very rare find, if not unique (Ludowici 2018; Schmölcke 2018). Notably, the burial is a *Gründergrab*, the earliest one on location, and also the wealthiest in grave construction and furnishings at this site, documenting the advent of a new leading family. Perhaps there was also a connection with two dogs buried close by. The find in Quedlinburg is the oldest among only a handful of burials with goshawks in central Europe, and may represent the earliest falconry in this area, notably connected with a woman (Ludowici 2018; Schmölcke 2018). However, the animals in the mentioned burial have also been interpreted in a symbolic manner; the predators – dog, goshawk and pike – stand for the elements earth, air and water, and a legitimation for dominion over the local population was deduced from that.

Bears

The present book contains three contributions on »bear and human«, and rightly the question arises of whether these are worthy contributions, coming as they do immediately after the publication of a large-scale book on the same subject (Grimm 2023a). It may come as a surprise, but the three contributions presented here can be seen as enriching the subject and, notably, each contribution has its own angle.

In the first contribution on bears in this book, written by **Ekaterina Kashina** and **Vladislav Zhitenev**, a long-term perspective is chosen, from the Late Pleistocene to the Early Bronze Age, in an intra-regional sense, which connects the northern latitudes of both western and eastern Europe. Emphasis, however, is rightly put on the archaeo(zoo)logical sources from Russia, which are this time presented in the English language. The paper follows the well-established assumption, as put forward by Ferdinand Braudel of the second generation of the French Annales school, that it is only the long-term consideration (*longue durée*) that makes changes in overall attitudes visible (Braudel 1958; Burke 1990).

The paper in question investigates the role of the cave, but much more so the brown bear in the lives and afterlives of humans. Based on bone finds, hunting, tool making and ritual aspects are discussed. While the bear as prey can be encountered more often in the Holocene than the Late Pleistocene, it definitely had some constant role(s) in spirituality in both epochs, though not as central as other animals (first, mammoth, horse and bison; later, elk and swan): the bear remained more hidden. The absence of bear images in east European Late Neolithic portable art is of particular interest, whereas these

animals occur, from time to time, in northern European rock art. This includes depictions of hunting at the den, foremost known from the famous northern Norwegian UNESCO world heritage site of Alta, which covers most of the last five millennia BC. But, even there, the bear did not play a central role (on Alta see Helskog 2012). At the turn from the Stone to the Early Bronze Age, portable bear images came into being, in the form of stone hammer axes with bear heads. Judging from their form, these were not actual weapons; they must have had some other meaning (we will return to this).

Archaeology aside, there is a strong indication for a special role ascribed to the bear: its taboo-name in the Slavic, but also the Germanic languages from times immemorial (Nedoma 2023; Særheim 2023; Udolph 2023). It suggests that the bear was regarded with both fear and admiration, and it could not be called by its real name (see below).

The second contribution on bears in this book, by lead author **Kirsty Squires**, leads us back to archives and information that are unpublished so far, but also an intra-regional perspective is chosen. The assumed Anglo-Saxon migration to England in the middle of the 1st millennium AD, as described by the monk Beda Venerabilis (672/673–735), is a controversial topic in archaeology (see for example Häßler 1998 on a conference to that effect), but it is now strongly supported by the a-DNA analysis of 460 medieval north-western Europeans, which points to just such a migration by a population mostly from Germany and Denmark (Gretzinger et al. 2022). This raises the question about common cremation burial rites in both areas and, in the present case, a bioarchaeological analysis of burials with bear claws and also, more broadly, other wild animal remains, has been conducted.

As regards England, a larger number of burials with bear claws comes from the early medieval period (5th to 7th centuries) in the east of England or, more precisely, cemeteries in Sancton I, Spong Hill, Elsham Wold, and Cleatham. However, a comprehensive zooarchaeological assessment has so far been available only for the latter two (O'Regan 2023), which comprises 16 burials that show differences in age, sex, and social level with no common denominator. It is only now, in the present paper, that the finds from Sancton I and Spong Hill have been taken into account, too. As for northern Germany, information on bear remains originates from only two cemeteries: Süderbrarup in northernmost (Bantelmann 1988; Wahl 1988) and Liebenau in northern Germany (introductory: Häßler 2001). The burials in question range from the late 4th to the 7th century. Details about cremation rites will have to be omitted here, but Liebenau is outstanding in both regional and east English respects. Suffice it to say that funeral pyres were lit on this burial sites and the remains then intentionally covered by sand and earth.

Analyses of the burials with the remains of wild animals in both England and northern Germany reveal that bear, bird, red deer, roe deer, and beaver are represented to a certain extent, whereas fox, hare, fish, marten and oyster are rare (following Squires and others, this volume). It was the adults of a population that were buried with the main species of bear, bird, dog and deer, while only Cleatham has burials of subadults with bear claws. Both women and men are represented; the former, more numerous, were more likely to be accompanied by parts of bears and birds, while the latter received those of deer and dogs as furnishings. Among the animal parts in the graves, there is a certain association between deer and sheep remains. The non-animal objects in the burials are very variable and do not point to any particular status. Interestingly, in the period in question, England probably no longer had a bear population (O'Regan 2023). The placement of the deceased on a bear skin and, as one may also suggest, the trading of such an item to England, might be indicated by the c. ten claws found in a burial in Cleatham. It is evident that more zooarchaeological work is needed for both England and Germany: it was called for 25 years ago by C. M. Hills (1998), but with little effect. As to Denmark, burials with bear claws belong to the first centuries AD and are thus older than their counterparts in England and northern Germany (briefly: Grimm 2013).

Let us take a brief look at the aforementioned two burial sites in northernmost Germany: one is located on the Anglian Peninsula (Süderbrarup), the other in »Old Saxony« (Liebenau), and they provide interesting insights, although the number of burials with bear remains is low, episodical and without statistical relevance, in contrast to the situation for the east of England.

The cemetery of Süderbrarup has yielded only two burials with bear claws, and both are above average: firstly an old man in grave 934, from the mid-4th century, whose furnishings belong to a military sphere and include a fragmentary belt with richly furnished bronze mounts, and secondly an adult man in grave 402, from the first half of the 5th century, with sherds of a glass vessel (such objects being known from only eleven local graves; see Bantelmann 1988; Wahl 1988; Rau 2010, vol. 1, 79–83). In the latter case, no less than 12 bear claws indicate – by their mere number – a former skin, and it is also remarkable that this is the burial with most animal remains at this site: alongside bear remains,

pig, sheep/goat and horse are also represented, in the latter case possibly a skull (!).

In turn, four burials in Liebenau have yielded bear remains: R13/B5, R14/B3, R14/B4, S13/B1; all are those of women, and at least one inventory is above average, due to the remains of a glass vessel (Häßler 1990; May 1994). In one burial, S13/B1 from the first half of the 7th century, not only five claws were recorded, but also the long bone and skull fragments of a bear, which point towards the placement of a skin on the funeral pyre. Interestingly, all four burials were found close to one another in the south-western part of the cemetery, which suggests close (family?) bonds, and there are signs of foreign influence (Thuringian, eastern Germany) in their non-animal furnishings (Wamers 2015).

In the third contribution on bears in this book (**Konstantin Skvorcov** and **Jaroslaw A. Prassolow**), burials with claws are introduced for the Kaliningrad area in Russia; so far, there had been no knowledge to that effect for this region. The seven cremation burials in question date to the first half of the 7th century (the »Dark Ages«, as termed regionally), and they came to light in short succession over the past years in large, flat burial sites in the Zelenogradskij district (former German *Kreis Fischhausen*). The graves are outstanding not only for their claws but also the general wealth of the inventories, which include gold votive bracelets and a silver neck ring (Alejka-7 burial site, with the burial of a man) and also drinking horns made of aurochs horn ornamented with pressed silver sheets (Putilovo-2, with the burial of a woman). As to the latter, somewhat ahistorically, the Late Hallstatt princely burial in Hochdorf in south-west Germany comes to mind, which is c. 2500 years old and has yielded no less than eight such horns from aurochs (!), interpreted as the belongings of a retinue (Hansen 2013). The graves in Kaliningrad are not only accentuated by their furnishings but also by outstanding grave constructions, with horses buried nearby, too. The number of burnt but unprocessed bear claws in the burials ranges from two up to twelve.

In the period in question, the area was inhabited by the West Balt tribe of Sambians (the *Aestii* in historical records). The foreign goods in the burials hint at the cultural influence of Germanic-speaking groups on *Aestii* society. This leaves two possibilities for explaining the sudden appearance of bear claws in the burials: either foreign goods, the bear claw burial rite and associated beliefs came from Germanic groups, or the deposition of bear claws was an independent feature based on the universal perception of the bear as a strong animal that evokes both admiration and fear (see below).

The composition of the cremation burials is also noteworthy; six men interred with weapons indicate a male and martial sphere, but the seventh burial is that of a woman (Putilovo). The deceased persons in the Kaliningrad region all seem to indicate an upper class, which is not the case in the North – there, burials of men and women with bear claws and sometimes skin have been recorded for inventories that range from poor to abundantly wealthy (see e. g. Mansrud 2023 for the Late Roman and Migration Period of southern Norway, and Grimm 2013, more generally). Remarkably, the finds from the Kaliningrad area can be paralleled with Migration Period Norway, where well-furnished and well-known weapon burials (Evebø and grave V in Snartemo) stand side by side with the grave of the so-called petty queen from Krosshaug. All these, however, are older inhumation burials that were also granted actual bear skins (Grimm 2023b).

It is exciting to see how, somewhat unexpectedly, the first burials with bear claws associated with an upper class have come to light in the Kaliningrad area. However, it can be assumed, by intra-regional comparison, that burials of the uppermost layer are yet to be found (!) – these could be identified by so-called *Kolbenarmringe*, heavy open gold arm rings that are thicker at their ends, foremost known from the famous late 5th-century Childeric burial in Tournai, Belgium (e. g. Werner 1980; von Carnap-Bornheim/Ilkjær 1996, vol. 5, 360–365). However, the aforementioned silver neck ring from a burial in the Kaliningrad area might have functioned in the same way. For the time being, it is simply too early to come to any wide-ranging conclusions for the burials with bear claws that have come to light in the Kaliningrad region. Patience is needed; will more such burials be discovered soon, and will they support or contradict the impressions gained so far?

To sum up the contributions on the bear: they yield a wealth of materials that enrich the recently published book »Bear and Human« (Grimm 2023a), and all three contributions are worth re-considering against a broader background.

In the following, three game changers will be introduced that strongly influence the interpretation of the bear-human relationship.

The first game changer is the actual hunt. In the present book, actual bear hunting is only encountered in parts of Stone Age Russia, more precisely in rock art (Kashina/Zhitenev, this volume). It depicts the hunt taking place at the den, as a communal action that aims to reduce the risks for the individual hunter. This kind of hunting is known for the Sami in rather recent times, too, and thus represents

a long-standing tradition (Iregren 2023). Bear trapping also has to be taken into account as, for example, shown in a woodcut in Olaus Magnus' »Historia de gentibus septentrionalibus« (1555). Place names from Norway are also indicative of trapping sites (Særheim 2023). However, historically, we know of yet another kind of bear hunting, apart from the one carried out at the den, in which the animals are driven by dogs in a desired direction where the hunter waits with his weapon: the bear-spear with »stoppers« (Oehrl 2013; Almond 2023). This is the despatching of a bear as a heroic deed, known *inter alia* from imagery on Roman mosaics and medieval hunting manuscripts, but also from a woodcut that adorns the aforementioned book by Olaus Magnus (Oehrl 2013; see also, more broadly, Animals Study Group 2006). One step further, the Late Roman scribe Ammianus Marcellinus has left a somewhat distorted remark on a Germanic tribe which may, however, point towards the killing of a bear as an initiation rite for entering adulthood and/or a warrior community.

How far back can we project this kind of hunting? Was it already practised many thousands of years ago in the period of hunters and gatherers, or was it a more recent facet in societies with increasing social complexity, and gradually restricted to noble and royal persons? In this context, Migration period »master warriors« in Sweden (Högom, mound 2) and Norway (Evebø; Snartemo, grave 5) warrant a mention, as they represent the richest male burials of their time (Grimm 2023b). The deceased were placed on bear skins by the bereaved. Were they thus staged not only as warriors but also as heroes who killed bears with spears? And were the berserks of Old Norse literature members of a warrior community who wore actual (bear) skins (Sundqvist 2023) and were further elevated in their role by an actual bear killing? However, quite remarkably, the oldest Iron Age burial in the North with a bear skin is that of a woman in Gotland, which is above average in its inventory. The so-called Migration Period petty queen in Krosshaug, south-western Norway, may have been placed on a skin, too (Grimm 2023b). How do we »read« these burials?

Stone figural axes and maces with bear heads also deserve attention (Kashina/Zhitenev, this volume). Occasional finds, some 50 objects, are known from coastal Sweden, Finland, north-western and northern Russia, with a concentration in Karelia and a rather broad dating to the 3rd millennium BC. They have been considered as »ritual stone weaponry« used as scepters and/or deposited ritually. Was martial prowess and masculinity attributed to these axes/maces by the bear heads, and did this also reflect the actual killing of bears as a heroic deed? However, although bear heads dominate, elk and unspecified animals are also represented.

The second game changer is the »the power of the paw«, a topic that has gained attention rather recently (Jahnsen 2023; Mansrud 2023). It takes its point of departure in still-existing bear paws, which made their way from farm to farm in inner western Norway for the healing of human or animal diseases or as a help during childbirth until the early 20th century. A tradition to that effect is quite possibly indicated by paws that came to light during excavations beneath the modern floors of medieval churches. Were they placed beneath the floor, as is argued, in the hope of »recharging« power for the aforementioned use but were then forgotten and not recovered? We can go one step further back by the radiocarbon-dating of one of these paws, found beneath a church floor. It is in fact from the Viking Age and originates from a polar bear, not a brown one (!).

With this find, we are already in the pre-Christian era, and thus it is legitimate to ask whether the belief in the power of the paw was a reality some centuries earlier, in the period when many hundreds of burials received bear claws, not only in Scandinavia but also in England and at the northernmost area of the central continent. If we follow this assumption, the entire discussion about the bear in the grave would have to take into account that one to five claws found in a burial may stem from a paw added to the funeral pyre because of its assumed power. And only from six claws upwards, i. e. more than one paw, could one rightly speculate about the role of a skin in the case of cremation burials.

The third game changer is the taboo and the ceremonial associated with the bear. We have to assume that the real word for the bear was lost or was rather suppressed in the Germanic and Slavonic languages (Nedoma 2023; Udolph 2023). It became taboo, because it was feared that when the bear was called by its real name it could overhear this human communication and conjure a dangerous encounter. The names used today mean »the brown one« (Germanic) and »honey-eater« (Slavonic), whereas earlier on – in times immemorial – the real but lost word for the bear was connected, linguistically, with the Latin »ursus« and the Greek »arktos«. A particularly late element of the »bear cult« among Germanic groups may be represented by the amazing archaeo-(zoo)logical finds in Frösö, northern Sweden. Below the choir of the early medieval stone church, the remains of a partly decomposed birch tree stump were found, surrounded by a dark layer containing bones (mostly from bears) and fire-cracked stones (Magnell 2023). Does this reflect the preparation of a ritual meal and the ritual deposition of bear bones at a holy

tree as the end of a bear ceremonial? In this respect, the Sami and Finno-Karelian »bear ceremonialism« also warrants a mention. The hunting and despatching of a bear was embedded into ceremonials before, during and after the hunt (Rydving 2023; Piludu 2023a; 2023b; 2023c). It was essential to show respect towards the despatched bear and the community of all living and dead bears, since only this would avoid trouble with the bear and guarantee future hunting success.

Animal Symbolism

Two contributions in this book are openly dedicated to animal symbolism: the first assumes a long-term perspective from premodern to medieval times in Belarus, and the considered animals, snake and duck, are seen as embodiments of religious content (**Maksim Čarnâûski**), whereas the second is concerned about the quite numerous animal representations (animal pendants, animal art) in Late Iron Age Estonia, considered as indicators of status rather than religion (**Tõnno Jonuks**).

Representations of animals in Estonian archaeology may not yet have found the attention they deserve, since, in fact, there is a wealth of material (in the following, based on Jonuks, this volume). Such representations can only be found in two periods of Estonian archaeology: among Stone Age hunters and fishers and in the Late Iron Age (9th to 13th centuries, with a peak in the last two centuries of this period). For the Late Iron Age, animals occur in different ways: firstly, as pendants made of animal teeth and bones (more than 200 finds) and, secondly, as representations on other objects (no given number). The animals used for the first (mostly bear, beaver, dog and pig/boar) and for the second kind (mostly snakes and oscine birds, but identification is sometimes problematic) are significantly different. Three kinds of creature can be encountered: furred animals, prestigious game species and creatures associated with rank and moral norms. While the first two are found among tooth and bone pendants, the latter appear in art and as animal-shaped pendants. These finds came to light mostly in central hillforts and settlements, which may imply some sort of status.

Besides animal pendants and animals in art, a third kind of representation has been omitted from study: the Animal Style, found on 10th–12th-century objects. The animals in question are highly stylised and interpretation is difficult; however, snake/dragon and wolf/lion seem to have played a role. All three forms of animal representation, taken together, may be seen as a reflection of a period of stress in society, under the growing influence of Christianity in the Baltic area.

To add detail, when it comes to the pendants made of animal tooth and bone, bear remains may represent communal or prestige hunting, the latter of which would be the despatching of the animal by a spear as a »heroic deed« (see above). For pendants made of tusks, it is not always clear whether they derive from domestic pig or wild boar. If wild, the question of communal or heroic hunting would arise again. Beavers may have been sought after for their fur, but they may also have been feared and despatched because of their nocturnal »landscape shaping« (Schmölcke et al. 2017). As regards animals in art, a 12th-century bird figurine from a grave in Kolu is particularly telling. The massive beak on this figure may suggest an eagle, but the zig-zag on that beak, the comb on the head and in particular the ears on both sides, marked by circles, might rather indicate a griffin. Quite remarkably, the object in question is interpreted as the handle of a staff, which thus was surely in the hand of a powerful person.

As to Belarus, the period from the 5th to the middle of the 2nd millennium BC saw local, probably genetically linked groups (beginning with the Narva culture), but periodically there was influence from incoming populations (first from the so-called Comb-Pit Ware culture) by which, in the mid-4th millennium BC, the image of the duck (waterfowl) and the snake (grass snake) was introduced (in the following based on Čarnâûski, this volume). These two animals occur first as motifs on ceramics and later as small sculptures/figurines of bone and clay, until the first half of the 2nd millennium BC. Before then, the Narva and Comb-Pit Ware cultures had merged into the Usviaty Culture, while others, which came from outside, had also left their imprint (Globular Amphora and Corded Ware cultures). The animal motifs (now as duck figurines/bone duck pendants and snake heads at the ends of bronze bracelets) appeared again in the period from the 5th to 11th centuries AD, and they were then associated with different populations (one was late Baltic and the other the so-called Smaliensk-Polack long mound culture, described in the chronicles as the Kryvichy tribe). With the spread of Christianity in the region, the motifs shifted into the oral tradition and can be seen in regional folklore. As has been argued, ducks were associated with a cosmogenesis myth that described the creation of the world (see also Jonuks, this volume), whereas the snake may have represented certain forces tied to the earth (or underworld). It is also worth a mention that for the forest hunter-gatherer-fishers of the central part of the East European Plain, snake and water-

fowl may have represented totemic ancestors in the period 3500–2700 BC (Kashina/Emelyanov 2020).

It might be said that it was the natural behaviour of the animals that attracted the attention of humans. The return of flocks of ducks, geese and swans was undoubtedly a significant event for a local population whose life was tied year-round to lakes. It signified the end of winter, the rebirth of nature and the arrival of warmer times, whereas the birds' departure indicated the approach of winter. As to snakes: for the settlers who lived predominantly near the shorelines of shallow, overgrown lakes and close to peatland and floodplain meadows, they were common animals. Their disappearance in wintertime was surely noticed, along with the conspicuous balls of entangled snakes in the autumn, which were getting ready to hibernate (see below on warrior, sword and snake in Viking Age Scandinavia)

Thus, ducks and snakes occur as motifs in two separate periods, with a considerable hiatus from the middle of the Bronze Age to the end of the Iron Age (middle of the 2nd millennium BC to 400 AD). Perhaps the assumed hiatus is only due to a general lack of knowledge for that time period. This leads to two possible explanations: either snake and duck imagery was represented over the entire period and handed down by different populations (cultures), domestic and immigrating, or there really were two different periods of time with duck and snake imagery, as their natural behaviour attracted a general interest and was interpreted in a comparable manner. It is an interesting side-note that disappearance during hibernation and return with offspring has also given rise to the so-called bear festivals – »bears bring spring«. Such festivals are recorded broadly for Europe but it remains an open question as to how old they really are (Bakels/Boer 2023; Frank 2023).

Further Consideration

In her contribution, **Valentina Mordvintseva** looks at »Sarmatia« in the North Pontic region, which saw different kinds of population in the period from the 3rd century BC to the mid-3rd century AD: »nomadic« (Volga-Don, partly Kuban) and »agricultural« (Crimea, Lower Dnieper and partly Kuban region). As for the settled population, it had contact with and was influenced by the urban centres of the Greek and later Roman civilizations. All in all, 557 funerary complexes of the »barbarian« elite from four chronological periods have been taken into account via their furnishings but not the grave constructions themselves. Analysis focuses on elite graves with animal remains and animal imagery, whereas the so-called »Polychrome Animal Style« from the areas adjoining the northern Black Sea is not considered; it reflects different handicraft traditions, and the objects in question often depict unidentifiable, mythological animals/beasts.

Animal remains, which are found in up to 60 % of the burials of a given time and region, mostly represent domesticates, that is, sheep/goat, cow, horse, and dog, whereas wild animals (boar, deer, bear and, in a single case, birds of prey) are mainly represented by »symbolic parts« (fangs, claws, horns) used as pendants. There are patterns in the burials; horse, cow and dog were staged as »full animal«, »partial animal« or »stuffed animal«, whereas sheep legs were often associated with knives, horse/cow bones with bronze cast cauldrons, and cow legs with plates.

Two images prevail: firstly, the »ungulate in the victim pose« by itself (lying down with its legs tucked under its body) or in a torment scene and, secondly, animals (horse, dog, boar) together with anthropomorphic characters (»rider«, »horsemen fighting«, »master of animals«). The heads of animals (domestic and wild) are usually found as decoration on jewellery (pendants, neck rings, bracelets), whereas full animal figures, separately or in interaction with other animals (confrontation, torment), or anthropomorphic features occur on different kinds of objects, such as clothing, tableware and weapons.

Besides these generalisations, however, regional variations are also worth a mention. Usually, there are only a few wild animal bones in settlement remains but in one area such bones – mainly of reindeer, deer and wild boar – amount to considerably more than 10 % of the overall number of animal bones (along the *Lower Dnieper*). Yet another area stands out by a wild boar skull and several deer antlers in male elite burials (*Kuban region*). Do these indicate elite hunting with a symbolic meaning? Episodically, wild boar bones, fragmentary deer antlers, but also the claws of an eagle (*Volga-Don* region) or boar tusks (*Crimea*) have come to light in burials.

To sum up, there are general features as much as regional variations for the different populations in North Pontic »Sarmatia«. Hunting is most prominently represented in the form of reindeer, deer and wild boar remains in settlement contexts, while boar skulls and deer antlers (shed and gathered or acquired by hunting after the despatching of the animal?) occur in graves, as well as pendants made from the fangs and claws of predatory animals. In this respect, a close look at the dogs (recorded quite frequently in the burials) and the eagle claws (in only one instance) may be telling. It would be worthwhile, too, to consider the present findings against the Eurasian Steppe culture more broadly. Given

the vast area of the steppe, horses were fundamentally important for mobility (see here the ongoing work in the ERC Synergy Grant »Horsepower. Interactions between China, Mongolia and the steppe 2000–0 BCE«; ERC-Grant no. 101071707; https://erc.europa.eu/sites/default/files/2022-11/erc_2022_syg_selected.pdf and www.horsepowerproject.org).

In his contribution, **Yury Esin** has a look at early raptor imagery among the herders of the Early Bronze Age steppe and the arid zone of Asia (mid-3rd to early 2nd millennium BC), and he also raises the important question of early falconry. This consideration is far from trivial as it must address a basic methodological issue; what can we accept as reliable proof for this kind of hunting in an archaeological context (Prummel 2018)? So far, there are two different materials at hand for discussing prehistoric falconry in Asia:

The first type of early material is visual. It is the image of a rider with a bird on the fist which, judging from its beak, is a raptor (Esin, this volume, fig. 1). This depiction originates from a mount in a burial in north-eastern China, which dates to the 2nd century BC, in an area of contact between steppe nomads and the sedentary population of Han Dynasty China (Wallace 2018, 1860–1861). This image, understood as the depiction of a mounted falconer with a raptor on the fist, is iconic for falconry in a broad manner, as it is known from hundreds over hundreds of later cases from different continents (see here Grimm 2020a; 2020b; note the title »Raptor on the Fist«). Remarkably, the image from north-eastern China – »the archtype« – is the earliest case to that effect. One may object critically that the placement of the bird is somewhat awkward in the present case; we would expect it not to face the rider but to look forward, as both horse and rider do, but this does not negate its evidential value. A misplacement of the bird on the fist is also known from other cases (see as one instance the earliest Arabic falconry image from early Islamic times; Grimm/Gersmann 2018, fig. 1).

The second type of early material is archaeozoological and it comprises bird skeletons (golden eagles) found in a few kurgans (Russia and Kazakhstan), the oldest of which are c. 2,500 years old (see briefly Kosintsev/Nekrasov 2018 and Nagler 2020). This material is also noteworthy inasmuch as entire skeletons (!) of golden eagles are present, which is the classical falconry bird in parts of the Eurasian Steppe (see for instance Keen 2018). However, a closer look is needed. In this respect, the famous early 7th-century Rickeby burial, which was found in an area to the north of Stockholm in Sweden, should be mentioned (Sjösvärd et al. 1983; Vretemark 2018; Grimm 2020c). To cut a long story short: In the case of Rickeby, an entire wealth of animal bones could be proven, since the funeral pyre was directly covered by a mound and later excavated in a very careful manner. Amongst the animals, one horse, several dogs with a potential use in hunting, several birds of prey used in falconry (one goshawk, one sparrowhawk, two peregrine falcons) and also the potential prey of falconry (black grouse, hazel grouse, crane) have been found in that burial. Thus, there is very good reason to suggest that the buried man, whom we may recognise as the member of a retinue, owing to the helmet and weapons, was a falconer in his lifetime or was at least »staged« as a falconer by the bereaved in the burial ceremony. As a matter of fact, two types of falconry can be visualised for Rickeby: the hunter on foot with a goshawk or sparrowhawk and the mounted one with a peregrine falcon. On top of this, there are several dozen burials in Sweden, more or less contemporary to the one at Rickeby, which have also yielded the same kind of animals (Vretemark 2018, list). And this brings us back to the kurgans with the golden eagle skeletons. In these cases, we have to wait for detailed analysis and publication of the graves – have other animals been found in these burials, too, and, if so, which ones? Would they support the assumption of falconry in the manner seen at Rickeby? For the time being, the Rickeby burial with all the aforementioned animal species makes a strong case for falconry, whereas the golden eagles in the kurgans do not.

Asian falconry continues to be the enigma in the overall discussion of this kind of hunting, in particular since hunting with golden eagles in the steppe area has been regarded as particularly old and, perhaps, the cradle from where the knowledge of this kind of hunting spread (see for example Warmbier 1959; Erdenebat 2018; Grimm/Gersmann 2018; Grimm/Gersmann 2024). Yury Esin will consider this topic further; only the first and lesser part of his analysis, which touches upon Early Bronze Age Asia (mid-3rd to early 2nd millennium BC) is presented here in this volume. In the light of the aforementioned source materials with evidential value for falconry – both visual and osteological – there is no way to substantiate the assumption of Early Bronze Age hunting with trained raptors in Asia (steppe and arid areas). It may well have already existed in that period of time, but there is no compelling evidence so far. In contrast, rock art may point towards the role of raptors in certain beliefs. It shows persons with raptor headdresses, persons with raptor heads and anthropomorphous beings together with smaller raptors. This imagery leads to a more general question: did humans first see raptors as divine beings or »masters of the sky« with particular power before

using them as hunters (see here Warburton 2018 on the Horus Falcon of Pharaonic Egypt, whereas falconry in that area came into being not before early Islamic times)?

To be on the safe side, so far there is no certainty about the age of falconry in the Eurasian Steppe, and thus, all kinds of broader attempts to reconstruct the archaeology and history of falconry for Europe, Northern Africa, Arabia and Asia are bound to fail. This also includes the discussion about the single or multiple invention of falconry (Grimm/Gersmann 2024). However, as regards the more western part of the steppe, Herodotus' writing on the Scythians from the 4th century BC may be seen as a warning against the assumption of millennia-old falconry; he has a lot to say about the Scythians but there is no mention of either raptors or falconry (Nagler 2020).

Synthesis

This book provides only a very limited number of archaeo(zoo)logical contributions, but they have a broad range, reaching from England to Russia and from the Late Palaeolithic (again for Russia) to early modern times (Lithuania). Furthermore, while all papers look at beasts, the actual content of the individual articles is quite varied.

However, there are subtopics:

- methodology (animals in the Natural Sciences and Humanities),
- hunter, huntress and hunting assistants as human's close companion (though, in fact, dogs and raptors were more than that),
- bears as animal agents, symbols and prey (with the animal both respected and feared),
- animal symbolism: from hare to dragon for Estonia (Late Iron Age) and from duck to snake for Belarus (Stone Age to medieval times) – however, animal symbolism is a broader topic that is also relevant for other animals considered in the book (such as bears),
- further consideration: wild animals of the North Pontic Region (»Sarmatia«) and raptors of Asia.

Any attempt to identify a common thread must start with the animals themselves, which can be ascribed to three different groups:

- firstly: wild beasts from the real world, such as aurochs from the English Neolithic and the »Dark Ages« of the Sambian Peninsula (7th century AD), but also boar and bear, which are described for different areas/time periods,
- secondly: imaginary beasts, whose existence, however, was quite probably taken as given (such as dragon and griffin for Estonia),
- thirdly: mythological beasts portrayed in abstract Animal Style, mentioned for Late Iron Age Estonia and the North Pontic region, c. 300 BC to 250 AD. This style, however, is not discussed in the present volume, and neither is the question of which kinds of animal – from the real world or imaginery – served as templates.

The first important overall aspect is the hunting of wild beasts. In this regard, two different types are to be distinguished: the communal hunt with its aim of reducing the risk for the individual hunter and the »heroic« hunt, in the final part of which the hero despatches the beast with a spear that has »stoppers«, at least in the case of bear and boar hunting (see above). It is open to debate when this heroic hunting came into being – does it go back thousands of years, in terms of trophy hunting or ceremonial despatching by which the successful hunter mastered some initiation ritual? In more recent times, this hunting was connected with (male) noble, if not royal, persons. Vilnius Lower Castle, which in medieval/early modern times served as a residential site, provides a lesson in big game hunting, by means of elk, deer and boar but also bison/aurochs, whose bones have come to light during the excavations (personal communication, Giedrė Piličiauskienė, on June 24th 2025). However, there was also the noble (royal) hunting by women (see here the papers on Lithuania, and the references above on the richly furnished woman from Quedlinburg, c. AD 500, and the Duchess Mary of Burgundy [1457–1482], the best known female hunter and falconer of the European Middle Ages).

The second important aspect is the »power of the wild beast« that could be acquired by the use of animal parts, be it bear skins worn by warriors (see above on the berserks) or prepared as a rug for the deceased (Norway, Sweden and Finland for parts of the 1st and early 2nd millennia AD). A beverage taken from an aurochs drinking horn (see here the wealthy burial of a woman from the »Dark Age« [7th century AD] of the Sambian Peninsula) might have been considered as »energising« as wearing pendants made of wild animal parts (see here the Late Iron Age of Estonia). In this respect, Norway is highly insightful

with the aforementioned belief in »the power of the bear paw«, which was a reality up to the beginning of the 20th century.

To some extent, the present book has a precedent: the proceedings of a conference from 2011, entitled »Representing Beasts in Early Medieval England and Scandinavia« (Bintley/Williams 2015). The eleven articles have diverse backgrounds in art, language, literature, place names and landscape.

This book itself yields no subchapters but a division can be made, following its introduction:

- the first four contributions delve into real and mythological beasts,
- two introduce written records and analyse animals (beasts) that possess hidden knowledge,
- three are about the influence of beasts upon the identities of peoples and landscapes,
- two address place name evidence for animal-human interaction in the landscapes of Anglo-Saxon England.

Three kinds of beasts emerge:

- real beasts from the same environments as humans,
- strange beasts, half glimpsed in the dark and/or seen only in the imagination, and
- »objects«, such as swords, being very much alive in the understanding of contemporaries, in contrast to our present one.

As regards »animated objects«, Sue Brunning (2015; see also 2019) looks at connections between snakes and swords in Viking Age Scandinavian culture, with a focus on serpentine ornamentation on swords and the literary (Scaldic) paraphrasing of swords as serpents (such as »wound snake« and »battle snake«). Snakes were both fascinating and frightening by their very nature, with their slithering movement, sharp bite, the swallowing of whole prey, their forked tongues, and piercing eyes. In physical appearance, long, thin and glossy sword blades could be likened to snakes, and this is also the case for the quick waving and blows (when seen as bites) of the sword in battle. Thus, there was a close connection between human (warrior), sword and snake, and the sword was very much seen as a living being. The discussion about »animated objects« continues; one example at hand is the role of the ring in the different versions of the famous Nibelung tale (see for example Hammer 2018).

Both books on beasts (the 2015 volume and the present one) complement each other and lead to a synthesis that goes beyond the result of just one book. Beasts from the real world are encountered in both cases but there is a difference between strange beasts, half glimpsed in the dark and/or seen only in the imagination (2015) and imaginary beasts whose existence was quite possibly taken as given plus mythological ones (present book). Of particular interest are the »animated objects« only represented in the earlier book.

The aforementioned study on the connection between snakes and swords is a prime example of how important it is to take into account source materials other than archaeology: in this case, literary sources but also snake biology. This approach also became apparent in the present book when rich animal remains from Lithuania were considered in the light of the high quality written records of the time. And, perhaps surprisingly, name-giving has turned out to be of utmost importance, in the case of the Germanic and Slavonic terms for bears (»name taboo«; see above).

What lies ahead? Human-Animal Studies are still a rather recent approach in archaeo(zoo)logy, and a lot of research remains to be done. Work at the (former) Centre for Baltic and Scandinavian Archaeology (2010–2023) has addressed different frameworks in the form of much-extended interdisciplinary conference proceedings : »Raptor and Human« and »Bear and Human« on the one hand, opposed to the »Archaeology of Hunting« and now the present book on the other. While the first two focus on only one animal species, the latter two focus on several.

An important aspect for future research is the question of »species archaeology«, with four different sectors: one of these could look at the animal as such through the lens of Animal Studies or Anthrozoology, then there is a »two species archaeology« (animal and human animal), followed by an »oligo species archaeology« and, finally, »multispecies archaeology«. Ideally, the latter would incorporate both fauna and flora. Despite attempts to that effect (Birch 2018, introductory Harris/Cipolla 2017, 152–169), one could call »multispecies archaeology« an unrealised if not unrealisable ideal. It would necessitate multiple perspectives covered by scholars with different backgrounds and, for more recent times, written and pictorial (art-historical) evidence would also be relevant. Recently, both the beaver-human and raptor-human relationships have been described in a promising way as a matter of co-habitation and multi-species-arrangement against a broader Stone Age context, but this cannot be elaborated upon any further (Hussain 2023; Hussain/Brusgaard 2023; see also Schmölcke/Grimm 2024 on four species, i. e. birds of prey, brown bears, beavers and elks, and similarities or differences in animal-human relationships in these cases).

Another instructive example at hand would be the human-horse-dog-raptor interaction in the most advanced form of falconry. This kind of hunting, with human, horse and dog as the assistants of the golden eagle, which was the actual hunter, was a reality in parts of the Eurasian Steppe, and still is to some extent (see e. g. Keen 2018). In contrast, hunting with peregrines or gyrfalcons, with the falconer in the saddle and the involvement of dogs, is long past in Europe (Grimm/Gersmann 2018).

It is the experience, after 15 years of work at the former Centre for Baltic and Scandinavian Archaeology, that Human-Animal Studies are very demanding, if they are expected to transcend region, time and scientific branch with the goal of creating broad syntheses that reach far beyond the realms of archaeo(zoo)logy. Taking this into account, further elaboration on a restricted basis, animal by animal, topic by topic, will be needed before a true synthesis can be reached with the tentative title »Animal and Human – Facets of a Multi-Layered Relationship«.

Bibliography

Almond 2023: R. Almond, Bear hunting in the later Middle Ages and early modern period, viewed from the perspective of art history and contemporary textual sources. In: Grimm 2023a, 149–170.

Animals Study Group 2006: The Animals Study Group (eds), Killing Animals (Urbana, Chicago 2006).

Bakels/Boer 2023: J. Bakels / A. M. Boer, Bears bring spring: An anthropological view on the role of the bear in middle European winter feasts: In: Grimm 2023a, 1147–1158.

Bang Andersen 2013: S. Bang Andersen, Prehistoric reindeer hunting in south-west Norway with emphasis on the period 1000 BC to AD 1000 – Overview, retrospect and perspectives. In: Grimm/Schmölcke 2013, 51–54.

Bantelmann 1988: N. Bantelmann, Süderbrarup. Ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln I: Archäologische Untersuchungen. Offa-Bücher 63 (Neumünster 1988).

Bednarek 2018: W. Bednarek, Emotions and motivation of the falconer and his relationship with the trained raptor – attempt at an evolutionary-biological interpretation. In: Gersmann/Grimm 2018, 285–312.

Beermann 2016: S. Beermann, Bärenkrallen und Bärenfelle in Brand- und Körpergräbern der vorrömischen Eisenzeit bis Völkerwanderungszeit in Mittel- und Nordeuropa. Univforsch. Prähist. Arch. 279 (Bonn 2016).

Bintley/Williams 2015: M. D. J. Bintley / T. J. T. Williams (eds), Representing Beasts in Early Medieval England and Scandinavia. Anglo-Saxon Stud. 29 (Woodbridge 2015).

Birch 2018: S. P. Birch (ed.), Multispecies Archaeology (London 2018).

Bleile 2018: R. Bleile, Falconry among the Slavs of the Elbe? In: Gersmann/Grimm 2018, 1303–1370.

Boccassini 2018: D. Boccassini, Falconry as royal »delectatio«: understanding the art of taming and its philosophical foundations in 12th- and 13th-century Europe. In: Gersmann/Grimm 2018, 367–387.

Braudel 1958: F. Braudel, Histoires et sciences sociales. La longue durée. Annales 1958(4), 725–753.

Brunning 2015: S. Brunning, »(Swinger of) the Serpent of Wounds«: Swords and Snakes in the Viking Mind. In: Bintley/Williams 2015, 53–72.

2019: S. Brunning, The Sword in Early Medieval Northern Europe. Experience, Identity, Representation. Anglo-Saxon Stud. 36 (Woodbridge 2019).

Burke 1990: P. Burke, The French Historical Evolution. The Annales School, 1929–89 (Cambridge 1990).

von Carnap-Bornheim/Ilkjær 1996: C. von Carnap-Bornheim / J. Ilkjær, Illerup Ådal. Die Prachtausrüstungen. Jysk Ark. Selskabs Skr. 25, 5–8 (Århus 1996).

Chrubasik 2018: K: Chrubasik, The tomb of the Polish King Władysław II Jagiełło (1386–1434) and its possible connection with falconry. In: Gersmann/Grimm 2018, 1427–1437.

Davis/Payne 1993: S. Davis / S. Payne, A barrow full of cattle skulls. Antiquity 67, 1993, 12–22.

DeMello 2021: M. DeMello, Animals and Society. An Introduction to Human-Animal Studies (New York 2021).

Derrida 2008: J. Derrida, The Animal That Therefore I Am (New York 2008 [original edition: L'Animal que donc je suis, Paris 2006]).

Erdenebat 2018: U. Erdenebat, A contribution to the history of Mongolian falconry. In: Gersmann/Grimm 2018, 587–602.

Fernández-Götz et al. 2021: M. Fernández-Götz / A. Gardner / G. Díaz de Liaño / O. J. T. Harris, Posthumanism in Archaeology: An Introduction. Cambridge Arch. Journal 31(3), 2021, 455–459.

Frank 2023: R. M. Frank, »The Bear's Son Tale«: Traces of an ursine genealogy and bear ceremonialism in a pan-European oral tradition. In: Grimm 2023a, 1107–1120.

Fredengren 2013: C. Fredengren, Posthumanism, the Transcorporeal and Biomolecular Archaeology. Current Swedish Arch. 21(1), 2013, 53–71.

2021: C. Fredengren, Beyond Entanglement. Current Swedish Arch. 29(1), 2021, 1–33.

Gansum 2018: T. Gansum, The royal Viking Age ship grave from Gokstad in Vestfold, eastern Norway, and its link to falconry. In: Gersmann/Grimm 2018, 717–726.

Gersmann/Grimm 2018: K.-H. Gersmann / O. Grimm (eds), Raptor and Human – Falconry and Bird Symbolism Throughout the Millennia on a Global Scale. Publication in considerable extension of the workshop at the Centre for Baltic and Scandinavian Archaeology (ZBSA) in Schleswig, March 5th to 7th 2014. Advanced Stud. Arch. Hist. Hunting 1 (Kiel, Hamburg 2018).

Giese 2018: M. Giese, The »De arte venandi cum avibus« of Emperor Frederick II. In: Gersmann/Grimm 2018, 1459–1469.

Gretzinger et al. 2022: J. Gretzinger / D. Sayer / P. Justeau / E. Altena / M. Pala / K. Dulias / C. J. Edwards / S. Jodoin / L. Lacher / S. Sabin / Å. J. Vågene / W. Haak / S. S. Ebenesersdóttir / K. H. S. Moore / R. Radzeviciute / K. Schmidt / S. Brace / M. A. Bager / N. Patterson / L. Papac / N. Broomandkhoshbacht / K. Callan / É. Harney / L. Iliev / A. M. Lawson / M. Michel / K. Stewardson / F. Zalzala / N. Rohland / S. Kappelhoff-Beckmann / F. Both / D. Winger / D. Neumann / L. Saalow / S. Krabath / S. Beckett / M. van Twest / N. Faulkner / C. Read / T. Barton / J. Caruth / J. Hines / B. Krause-Kyora / U. Warnke / V. J. Schuenemann / I. Barnes / H. Dahlström / J. J. Clausen / A. Richardson / E. Popescu / N. Dodwell / S. Ladd / T. Phillips / R. Mortimer / F. Sayer / D. Swales / A. Stewart / D. Powlesland / R. Kenyon / L. Ladle / C. Peek / S. Grefen-Peters / P. Ponce / R. Daniels / C. Spall / J. Woolcock / A. M. Jones / A. V. Roberts / R. Symmons / A. C. Rawden / A. Cooper / K. I. Bos / T. Booth / H. Schroeder / M. G. Thomas / A. Helgason / M. B. Richards / D. Reich / J. Krause / S. Schiffels, The Anglo-Saxon migration and the formation of the early English gene pool. Nature 610(7930), 2022, 112–119.

Grimm 2013: O. Grimm, Bear-skins in northern European burials and some remarks on other bear-related furnishings in the north and middle of Europe in the first millenium AD. In: Grimm/Schmölcke 2013, 277–296.

2018: O: Grimm, From Aachen in the west to Birka in the north and Mikulcice in the east – some archaeological remarks on bird of prey bones and falconry as being evidenced in premodern settlement contexts in parts of Europe (pre and post 1000 AD). In: Gersmann/Grimm 2018, 479–493.

2020a: O. Grimm (ed., in cooperation with K.-H. Gersmann and A.-L. Tropato), Raptor on the Fist – Falconry, its Imagery and Similar Motifs Throughout the Millennia on a Global Scale. Publication in considerable extension of a conference at the New York University Abu Dhabi (NYUAD) in the United Arab Emirates, March 5th to 8th 2018. Advanced Stud. Arch. Hist. Hunting 2 = Advanced Stud. Ancient Iconography II, edited by the ZBSA/Centre for Baltic and Scandinavian Archaeology in the Foundation of the Schleswig-Holstein State Museums, Schloss Gottorf, Schleswig, Germany, and NYUAD/New York University Abu Dhabi, United Arab Emirates, made possible by generous support of the International Fund for Houbara Conservation (IFHC, United Arab Emirates) and the Emirates Falconers' Club (EFC), United Arab Emirates (Kiel, Hamburg 2020).

2020b: O. Grimm, Raptor on the fist: falconry, its imagery and similar motifs throughout the millennia on a global scale – a synthesis against a broader background. In: Grimm 2020a, 17–33.

2020c: O. Grimm, The early 7th century AD Rickeby (Vallentuna) cremation grave from mid-east Sweden, understood as a three-dimensional painting/still life embodying three different kinds of falconer. In: Grimm 2020a, 481–488.

2023a: O. Grimm (ed., in cooperation with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human – Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. A volume based on papers presented at a conference at Orsa Predator Park, Dalarna, Sweden, Oct. 16th to 18th, 2019. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023).

2023b: O. Grimm, Bear skin burials revisited: Norway and Sweden, mainly Migration Period. In: Grimm 2023a, 533–546.

Grimm/Gersmann 2018: O. Grimm / K.-H. Gersmann, Introduction, discussion and summary: raptor and human – falconry and bird symbolism throughout the millennia on a global scale. In: Gersmann/Grimm 2018, 18–25.

2024: O. Grimm / K.-H. Gersmann, On falconry and the question of single or multiple invention. In: J. Schneeweiß / M. Nawroth / H. Piezonka / H. Schwarzberg (eds), Man sieht nur, was man weiß. Man weiß nur, was man sieht. Globalhistorische Perspektiven auf interkulturelle Phänomene der Mobilität. Festschrift für Hermann Parzinger zum 65. Geburtstag. Prähist. Arch. Südosteuropa 33 (Rahden/Westf. 2024) 503–515.

Grimm/Schmölcke 2013: O. Grimm / U. Schmölcke (eds), Hunting in Northern Europe until 1500 AD – Old Traditions and Regional Developments, Continental Sources and Continental Influences. Papers presented at a workshop organised by the Centre for Baltic and Scandinavian Archaeology. Schleswig, June 16th and 17th 2011. Schr. Arch. Landesmus. Schloss Gottorf, Ergr. 7 (Schleswig 2013).

Häßler 1990: H.-J. Häßler, Das sächische Gräberfeld bei Liebenau, Kreis Nienburg/Weser. Stud. Sachsenforsch. 5, 3 (Hildesheim 1990).

1998: H.-J. Häßler (ed.), Die Wanderung der Angeln nach England. 46. Internationales Sachsensymposium, Archäologisches Landesmuseum, Schloß Gottorf, 3.–5. September 1995. Stud. Sachsenforsch. 11 (Hildesheim 1998).

2001: RGA² (2001) 348–353 s. v. Liebenau (H.-J. Häßler).

Hammer 2018: A. Hammer, Der Ring der Nibelungen: Der Ring als Ding und Akteur in den skandinavischen und deutschen Versionen des »Nibelungenstoffes«. In: A. Bauer / A. Pesch (eds), Hvanndalir – Beiträge zur europäischen Altertumskunde und mediävistischen Literaturwissenschaft. Festschrift für Wilhelm Heizmann. RGA Ergbd. 106 (Berlin, Boston 2018) 97–118.

Hansen 2013: L. Hansen, Hunting in the Hallstatt period – The example of the Eberdingen-Hochdorf »princely grave«. In: Grimm/Schmölcke 2013, 239–258.

Haraway 2003: D. Haraway, The Companion Species Manifesto. Dogs, People, and Significant Otherness (Chicago 2003).

Harris/Cippola 2017: O. J. T. Harris / C. N. Cipolla, Archaeological Theory in the New Millennium. Introducing Current Perspectives (London, New York 2017).

Hartmann in print: S. Hartmann, The complex phenomenon of the Middle to Final Neolithic »cattle burials« of Central Europe. In: S. Trixl / C. Berszin (eds, in cooperation with H. Grabmayer / G. K. Kunst / U. Schmölcke / E. Stephan), Festschrift zum Dreißigjährigen Bestehen der Gesellschaft für Archäozoologie und Prähistorische Anthropologie. Beitr. Archäozool. Prähist. u. Anthr. Ges. Archäozool. u. Prähist. Anthr. e. V. XII (Tübingen, in print).

Helskog 2012: K. Helskog, Bears and meanings among hunter-fisher-gatherers in Northern Fennoscandia 9000–2500 BC. Cambridge Arch. Journal 22(2), 2012, 209–236.

Hills 1998: C. M. Hills, Did the people of Spong Hill come from Schleswig-Holstein? In: Häßler 1998, 145–154.

Holm Sørensen 2013: B. Holm Sørensen, Dogs in the Danish Viking Age – The Ladby Ship and other finds. In: Grimm/Schmölcke 2013, 163–174.

Hussain 2023: S. T. Hussain, Raptors as Campanions: Deep-Time Forays in Multispecies Archaeology. In: R. J. Wallis (ed.), The Art and Archaeology of Human Engagements with Birds of Prey. From Prehistory to the Present (London 2023) 11–37.

Hussain/Brusgaard 2024: S. T. Hussain / N. Ø. Brusgaard, Human-beaver cohabitation in the Early and Mid-Holocene of Northern Europe: Re-visiting Mesolithic material culture and ecology through a multispecies lens. The Holocene 34(1), 2024, 25–55.

Indrelid 2013: S. Indrelid, »Industrial« reindeer hunting in the south Norwegian mountains in the Viking Age and Early Middle Ages. In: Grimm/Schmölcke 2013, 55–74.

Iregren 2023: E. Iregren, Sámi bear graves – results from archaeological and zooarchaeological excavations and analyses in the Swedish part of Sápmi. In: Grimm 2023a, 547–586.

Jahnsen 2023: J. B. Jahnsen, Bears in churches: Skins, paws, and claws from Norway. In: Grimm 2023a, 795–810.

Janssens et al. 2018: L. A. Janssens / L. Giemsch / R. Schmitz / M. Street, A new look at an old dog: Bonn-Oberkassel reconsidered. Journal Arch. Science 92, 2018, 126–138.

Jennbert 2021: K. Jennbert, Post-humanistic Approaches in Archaeology. Current Swedish Arch. 29(1), 2021, 43–47.

Karaskova-Hesry 2020: O. Karaskova-Hesry, Mary of Burgundy (1457–1482): lady with a hawk. In: Grimm 2020a, 819–833.

Kashina/Emelyanov 2020: E. Kashina / A. Emelyanov, In bird we trust: bone bird pendants made by forest hunter-gatherer-fishers in the central part of the East European Plain (3500–2700 BC). In: Grimm 2020, 403–416.

Keen 2018: D. Keen, The hunter, the eagle, and the nation: Qazaq traditional knowledge in the post-Soviet world. In: Gersmann/Grimm 2018, 113–126.

Kirkinen et al. 2020a: T. Kirkinen / J. Riikonen / C. J. Dove / J. Ruohonen, The identification and use of fur and feathers excavated from the Late Iron Age and early medieval (12th–13th centuries) Ravattula Ristimäki cemetery in Kaarina, Southwest Finland. Fennoscandia Arch. XXXVII, 2020, 45–59.

2020b: T. Kirkinen / K. Vajanto / S. Björklund, Animal-hair evidence in an 11th century female grave in Luistari, Finland. Arch. Textiles Rev. 62, 2020, 109–125.

Kompatscher et al. 2017: G. Kompatscher / R. Spannring / K. Schachinger, Human-Animal Studies. Eine Einführung für Studierende und Lehrende (Wien 2017).

Kosintsev/Nekrasov 2018: P. Kosintsev / A. Nekrasov, An archaeozoological survey of remains of birds of prey in the West Eurasian steppe. In: Gersmann/Grimm 2018, 565–578.

Ludowici 2018: B. Ludovici, Chamber grave 41 from the Bockshornschanze near Quedlinburg (central Germany): evidence of the practice of falconry by women from the middle of the 1st century? In: Gersmann/Grimm 2018, 1293–1302.

Magnell 2023: O. Magnell, Bear bones from the Viking Age cult place at Frösö church – the unifying factor in bear-human relationships in Viking Age Jämtland, northern Sweden. In: Grimm 2023a, 429–452.

Mannermaa 2013: K. Mannermaa, On whooper swans, social zooarchaeology and traditional zooarchaeology's weight. Arch. Dialogues 20(2), 2013, 152–155.

Mansrud 2023: A. Mansrud, The power of the paw. Multi-species perspectives on the bear claw burial tradition in a long-time perspective in South Norway. In: Grimm 2023a, 489–532.

May 1994: E. May, Die Pferdeskelette aus den Pferdegräbern und weitere Tierknochenfunde aus dem Gräberfeld von Liebenau. In: H.-J. Häßler (ed.), Das sächsische Gräberfeld bei Liebenau, Kreis Nienburg (Weser), Teil 5. Einzelstudien und naturwissenschaftliche Untersuchungsergebnisse. Stud. Sachsenforsch. 5, 4 (Hannover 1994) 133–183.

Nagler 2020. A: Nagler, The burial of birds of prey in kurgan Arzhan 2 (Tuva, southern Siberia, Russian Federation, 7th century BC) and its meaning. In: Grimm 2020, 327–336.

Nedoma 2023: R. Nedoma, Germanic »bear« and Germanic personal names before c. AD 1000 with elements referring to »bear«. In: Grimm 2023a, 921–932.

Nichols 2021: C. Nichols, Domestic dog skeletons at Valsgärde cemetery, Uppland, Sweden: Quantification and morphological reconstruction. Journal Arch. Scien.: Reports 36 (2021).

Nockert 1991: M. Nockert, The Högom find and other Migration period textiles and costumes in Scandinavia. Arch. and Environment 9 (Uddevalla 1991).

Oehrl 2013: S. Oehrl, Bear hunting and its ideological context (as a background for the interpretation of bear claws and other remains of bears in Germanic graves of the 1st millennium AD). In: Grimm/Schmölcke 2013, 297–332.

O'Regan 2023: H. O'Regan, Brown bears in burials and entertainment in later prehistoric to modern Britain (c. 2400 BC – AD 1900s). In: Grimm 2023a, 187–208.

Orten Lie 2018: R. Orten Lie, Falconry, falcon-catching and the role of birds of prey in trade and as alliance gifts in Norway (800–1800 AD) with an emphasis on Norwegian and later foreign participants in falcon-catching. In: Gersmann/Grimm 2018, 727–786.

Overton/Hamilakis 2013: N. J. Overton / Y. Hamilakis, A manifesto for a social zooarchaeology. Swans and other beings in the Mesolithic. Arch. Dialogues 20(2), 2013, 111–136.

Petersen 2005: P. V. Petersen, Stortandede harpuner – og jagt på hjortevildt til vands. Aarb. Nordisk Oldkde. og Hist. 2005, 43–54.

2013: P. V. Petersen, Mesolithic Dogs. In: Grimm/Schmölcke 2013, 147–162.

Piggott 1962: S. Piggott, Heads and hoofs. Antiquity 36, 1962, 110–118.

Pigière et al. 2022: F. Pigière / F. McCormick / L. Olet / D. Moore / F. O'Carroll / J. Smyth, More than meat? Examining cattle slaughter, feasting and deposition in later 4th millennium BC Atlantic Europe: A case study from Kilshane, Ireland. Journal Arch. Scien.: Reports 41 (2022).

Piludu 2023a: V.-M. Piludu, The songs and rituals of the Finno-Karelian bear hunt: Gifts, seduction and mimesis in the forest. In: Grimm 2023a, 693–722.

2023b: V.-M. Piludu, The Finno-Karelian bear feast and wedding: The bruin as a guest-of honour of the village. In: Grimm 2023a, 723–744.

2023c: V.-M. Piludu, The Finno-Karelian bear skull rituals: Bringing the bruin home to ensure its regeneration. In: Grimm 2023a, 745–760.

Pluskowski 2006: A. Pluskowski, Where are the wolves? Investigating the scarcity of European Grey Wolf (*Canis lupus lupus*) remains in medieval archaeological contexts and its implications. Internat. Journal Osteoarch. 16(4), 2006, 279–295.

Prummel 1992: W. Prummel, Early medieval dog burials among the Germanic tribes. Helinium 32(1/2), 1992, 132–194.

2018: W. Prummel, The archaeological-archaeozoological identification of falconry – methodological remarks and some Dutch examples. In: Gersmann/Grimm 2018, 467–478.

Rau 2010: A. Rau, Nydam mose – Die personengebundenen Gegenstände. Jysk Ark. Selskabs Skr. 72 (Aarhus 2010).

Richter 2018: T. Richter, Practicalities of falconry, as seen by a present-day falconer. In: Gersmann/Grimm 2018, 55–86.

Roscher et al. 2021: M. Roscher / A. Krebber / B. Mizelle (eds), Handbook of Historical Animal Studies (Berlin, Boston 2021).

Russell 2012: N. Russell, Social Zooarchaeology. Humans and Animals in Prehistory (Cambridge 2012).

Rydving 2023: H. Rydving, »The Bear Ceremonial« and bear rituals among the Khanty and the Sami. In: Grimm 2023a, 677–692.

Schmölcke 2013: U. Schmölcke, The evidence for hunting dogs from Mesolithic times up to the Viking Age from a zoological point of view – A survey. In: Grimm/Schmölcke 2013, 175–183.

2018: U. Schmölcke, Central European burials with birds of prey from the middle of the 1st millennium AD – a short survey of the early history of archaeozoology in connection with these burials. In: Gersmann/Grimm 2018, 495–505.

Schmölcke/Grimm 2024: U. Schmölcke / O. Grimm, A Special Relationship – Aspects of Human-Animal in Birds

of Prey, Brown Bears, Beavers, and Elk in Prehistoric Europe. Animals 14, 2024, 1–27.

Schmölcke et al. 2017: U. Schmölcke / D. Groß / E. Nikulina, Bears and beavers. »The Browns« in daily life and spiritual world. In: B. V. Eriksen / A. Abegg-Wigg / R. Bleile / U. Ickerodt (eds), Interaction without Borders. Exemplary Archaeological Research at the Beginning of the 21st Century (Schleswig 2017) 901–916.

Sjösvärd et al. 1983: L. Sjösvärd / M. Vretemark / H. Gustavson, A Vendel warrior from Vallentuna. In: J. P. Lamm / H. Ä. Nordström (eds), Vendel Period Studies. Transactions of the Boat-Grave Symposium in Stockholm, February 2–3, 1981. Mus. Nat. Ant., Stockholm, Stud. 2 (Stockholm 1983) 133–150.

Street et al. 2015: M. Street / H. Napierala / L. Janssens, The late Palaeolithic dog from Bonn-Oberkassel in context. In: L. Giemsch / R. W. Schmitz (eds), The Late Glacial Burial from Oberkassel Revisited. Rhein. Ausgrab. 72 (Darmstadt 2015) 1–22.

Sundqvist 2023: O. Sundqvist, Bears in Old Norse religion with specific references to the berserkir. In: Grimm 2023a, 655–676.

Sykes 2018: B. Sykes, The Wolf Within. The Astonishing Evolution of the Wolf into Man's Best Friend (London 2018).

Særheim 2023: I. Særheim, *Bjørnestad*, *Bjørnbåsen*, and *Godfardalen*: Bear/human relations as referred to in place names from southwestern Norway. In: Grimm 2023a, 903–920.

Teegen 2018: W.-R. Teegen, The skeletons of a peregrine and a sparrowhawk and the spatial distribution of birds of prey in the Slavonic fortification of Starigard/Oldenburg (Schleswig-Holstein, northern Germany, 7th–13th centuries). In: Gersmann/Grimm 2018, 1371–1398.

Udolph 2023: J. Udolph, The Slavic word for »bear«. In: Grimm 2023a, 933–938.

Wahl 1988: J. Wahl, Süderbrarup. Ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln II. Anthropologische Untersuchungen. Offa-Bücher 64 (Neumünster 1988).

Wallace 2018: L. Wallace, The early history of falconry in China (2nd to 5th centuries AD) and the question of its origins. In: Gersmann/Grimm 2018, 1847–1863.

Wamers 2015: E. Wamers, Franconofurd 2. Das birituelle Kinderdoppelgrab der späten Merowingerzeit unter der Frankfurter Bartholomäuskirche (»Dom«). Archäologische und naturwissenschaftliche Untersuchungen. Schr. Arch. Mus. Frankfurt 22/2 (Regensburg 2015).

Warburton 2018: D. A. Warburton, Egypt and earlier: birds of prey in the human mind at the dawn of history. In: Gersmann/Grimm 2018, 325–346.

Warmbier 1959: J. Warmbier, Der Zusammenhang zwischen Falknerei und Reiterkultur [Diss. Freie Univ. Berlin 1959].

Weber 2013: M.-J. Weber, Late Upper and Late Palaeolithic reindeer hunting in the Ahrensburg tunnel valley – Differences between Hamburgian and Ahrensburgian hunting tactics. In: Grimm/Schmölcke 2013, 75–90.

Werner 1980: J. Werner, Der goldene Armring des Frankenkönigs Childerich und die germanischen Handgelenksringe der jüngeren Kaiserzeit. Frühmittelalterl. Stud. 14, 1980, 1–41.

Zinoviev 2018: A. Zinoviev, Early falconry in Russia. In: Gersmann/Grimm 2018, 1251–1270.

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Method

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Distinguishing between the Archaeological Remains (Teeth and Bones) of Dogs and Wolves

ABSTRACT

Scientists have long theorized about the origin of dogs. Once it was clear that they originated from wolves, the challenge was to discern between wolf and dog bones in archaeological settings. In recent years, interest in wolf domestication soared because it is by far the earliest domesticated animal and the only one domesticated already in the Pleistocene. Based on this interest, genetics were used to resolve the wolf domestication puzzle. At the same time, a renewed interest in morphological research blossomed and most historically reported differences were re-examined. This led to the rejection of many of them as discerning landmarks. Some survived, however, of which the most important ones are size reduction, relative brain size reduction, difference in maxillary premolar 4 mesio-distal diameter, orbital angle, and snout width and height.

KEYWORDS

Domestication / wolf / dog / morphometrics / morphology

Wolves, Dogs and Human Beings

Most of us will know Charles Perrault's (and Jacob and Wilhelm Grimm's later version of it) 17th-century fairy tale »Little Red Riding Hood«, an Anglo-Saxon title adaptation of the original »Little Red-Cap«, which is a more accurate translation of the oldest »Le Petit Chaperon Rouge« version[1]. Apart from being a sensually loaded story, it covers many opposites: youth versus old age, caring versus being cared for, danger (wolf) versus safety (hunter), and nature versus culture. It also exemplifies a worldwide-accepted opinion: wolves (*Canis lupus lupus*) must be distrusted and feared.

Although wolves may genetically be very closely related to dogs, both groups have a very different interaction pattern with humans. In general, there seems to be a ubiquitous fear of wolves and a close and friendly interaction with their domesticated descendants: dogs. Since dogs were domesticated from wolves at some time during the late Pleistocene, and since osteological canid remains are excavated frequently in archaeological contexts from that period, it is important to distinguish between both groups, first to document the process, location and timing of the domestication of wolves, but also to understand

1 https://beq.ebooksgratuits.com/vents/Perrault-contes.pdf (accessed 6.8.2025).

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human interactions with wolves and dogs before the existence of writing. The excavated remains of wolves might indicate that they were trapped, hunted, caught, and slaughtered for fur, sinew, tooth ornaments and more, while the excavated dog remains might indicate that they were domestic and were used as barking guardians or for defence, for hunting, for help with finding one's way back in the dark, and for much more, not least for emotional reasons.

The Search for the Origin of Dogs

Scientists have examined the origin of dogs for over a century (Rütimeyer 1861; Galton 1865; Gaudry/Boule 1892; Wolfgram 1894; Studer 1901), questioning where, when, and from which ancestor dogs originated. Not so long ago, it was suggested that two immediate ancestors existed: the grey wolf, being the ancestor of large dogs, and the jackal (*Canis aureus*) as the ancestor of small dogs (Darwin 1868; Lorenz 1954).

Is the Wolf the Sole Ancestor of the Dog?

More recent authors (as well as Nobel Prize winner Lorenz himself in later publications), mainly following recent genetic evidence, rejected the jackal and pointed, without doubt, to the wolf as the sole ancestor of the dog (Lindblad-Toh et al. 2005; Anderson et al. 2009; VonHoldt et al. 2010; 2018; Klütsch/Savolainen 2011; Larson et al. 2012; Larson/Burger 2013; Thalmann et al. 2013; Freedman et al. 2014).

From Which Wolf Clade, and thus Where, Did the Dog Originate?

Hypotheses about the number of times that wolves were domesticated include that it was a single event (as for almost all other domesticated species; see Savolainen et al. 2002; Freedman et al. 2014), and that there were dual (Frantz et al. 2016) or even multiple origins (Vilà et al. 1997; Skoglund et al. 2011).

It was first suggested, based on mitochondrial DNA (mtDNA), that the Eurasian (not American) wolf must have been the dog's ancestor (Thalmann et al. 2013), a suggestion that has been confirmed several times by additional, more recent, nuclear DNA (nDNA) studies.

As for the more specific origin region and related wolf clade, studies pointed respectively to Asia (Botigué et al. 2017), the Far East (Pang et al. 2009), Central Asia (Shannon et al. 2015), the Middle East (Gray et al. 2010) and Southeast Asia, the latter based on the high allelic variability in the local dogs there (Wang et al. 2013). A more recent large-scale study proposed a possible dual ancestry of dogs (two different wolf clades and regions contributing; Bergström et al. 2020; 2022), while another recent study proved the Japanese wolf (*Canis lupus hodophilax*) to be the most closely related to dogs (of all the wolf clades ever examined; Gojobori et al. 2021). Interestingly, and considering that dogs originated around the Last Glacial Maximum (LGM; see also below), Eastern Asia then had sea levels 125 m lower than today, with Japan being connected to mainland China by a massive land bridge.

If the Southeast Asian origin is correct (and there are several strong genetic arguments in that direction), dogs must have spread from there to the west, accompanying humans. On that route, and in the Middle East, a genetic input from local wolves (probably *Canis lupus pallipes*) must have taken place, explaining – at least partially – the small stature of archaeological dogs. Size reduction in dogs occurred in part by the introduction of the IGF1 allele, present in *Canis lupus pallipes* (Gray et al. 2010; Klütsch/de Caprona 2010). However, even without the Middle Eastern genetic input, we know that the oldest dogs were considerably smaller than wolves but clearly larger than *Cuon alpinus* (dhole) or the jackal, two contemporary and isopatric species in Europe and Asia. Neolithic dogs from the Alpine and Scandinavian regions areas are, for example, comparable in size to modern toy-poodles. Large dogs are only found in excavations from the Bronze Age on.

When Did Dogs Originate?

The next question to resolve is how long have dogs existed? Because, simply said, if they originated e. g. 400,000 years ago, archaeologists must carefully consider carnivore bones, discovered in excavated *Homo heidelbergensis* or *neanderthalensis* deposits, to possibly be those of dogs. Luckily, life is simpler

and, although the modern wolf originated about 400,000 years ago (Sotnikova/Rook 2010), dogs have only been present for a few tens of thousands of years, first appearing in late Palaeolithic *Homo sapiens* contexts. The dating of the first emergence of the dog can be investigated by the dating of excavated dog bones and by genetics.

Archaeological Dating

Only a few Palaeolithic and very early Holocene dogs are reported in the literature around the world (c. 30 specimens; **tab. 1**). Often the excavated bone remains are fragmented, partial, and incomplete, making determination less straightforward.

The »oldest« dog has long been the German Bonn-Oberkassel specimen (**fig. 1**), which was discovered more than 100 years ago and has recently been redated to 14,300 cal BP (Janssens et al. 2018). The dog remains were accidentally discovered by quarrymen and found along with those of a man and woman, all carefully buried together with grave goods under a thick stone slab. Of a similar age are several dog remains – also from burials – from the excavations at the Natufian settlements of Hayonim and Lake Gallilei-Eynan in Israel (Clutton-Brock 1962; 1963; Dayan 1994a; 1994b). Recently, even older specimens have been reported: some in Italian caves and in French excavations, of which the pinnacle specimen is the Spanish Erralla dog, dating to 17,300 cal BP (Hervella et al. 2022).

The information we have on early dog remains is heavily influenced by culture. Western Europe has a long tradition of extensive archaeological research, not only in its home countries but also in colonies, protectorates and countries that were under strong political and economic Western influence (such as the Middle East by Great Britain). Based thereon, the oldest dogs have all been excavated in these regions. There is a phenomenal vacuum regarding excavations that report on Pleistocene wolf and dog remains in countries such as China, Korea and Japan: countries that might well be the cradle of dogs.

Considering that there must have been a time lapse between the dog's origin in Southeast Asia and the presence of the Erralla dog in Spain, we may assume that the origin of the dog dates to at least 18,000 years ago.

Fig. 1 The remains of the Bonn-Oberkassel dog (14,300 cal BP), long considered to be the earliest dog in the world. – (Photo J. Vogel, LVR-LandesMuseum Bonn).

Specimens	Dating of dog remains (Lab. code and uncalibrated result BP [if not stated otherwise])	cal BP (kya)	mtDNA clade	Country	MNI	References
Pleistocene						
Eralla	Ua-56946: 14,221 ± 48	17.3	C	Spain	1	Altuna et al. 1984; Hervella et al. 2022
Monruz		16.0		Switzerland	2	Leesch/Müller 2012
Hauterive-Champréveyres		15.5		Switzerland	1	Morel et al. 1997
Montespan		14.5		France	1	Pionnier-Capitan et al. 2011
Le Morin	OxA-23627: 12,540 ± 55; OxA-23628: 12,450 ± 55	14.5		France	2	Boudadi-Maligne et al. 2012
Montespan	GifA-99102: 10,730 ± 100 (12,952-12,451)	14.5		France	1	Pionnier-Capitan et al. 2011
Mège		14.5		France	?	Boudadi-Maligne et al. 2018
Le Morin		14.5		France	1	Boudadi-Maligne et al. 2012
Hayonim and Lake Gallilei-Eynan		14.5		Israel	2	Tchernov/Valla 1997; Grosman et al. 2013
Le Closeau-Rueil Malmaison		14.4		France	1	Pionnier-Capitan et al. 2011
Bonn-Oberkassel	KIA-41161/41162/41163: 12,279; OxA: 14793 ± 100*	14.2	C	Germany	2	Street 2002; Street/Jöris 2015; Janssens et al. 2018
Kesslerloch	KIA-33350: 12,225 ± 45	14.1	C	Switzerland	1	Napierala/Uerpmann 2012
Anton Koba		14.0		Spain	1	Hervella et al. 2022
Grotta Paglici	OxA-26316: 12175 ± 55	13.8	B	Italy	1	Boschin et al. 2020
Duruthy		13.5		France	1	Boudadi-Maligne et al. 2018
Pont d'Ambon	GifA-99102: 10,730 ± 100; 12,952-12,541 cal BP	12.7	C	France	3	Pionnier-Capitan et al. 2011; Boudadi-Maligne et al. 2018
Pelegawra		12.5		Iraq	1	Turnbull/Reed 1974
Troubat	OxA-36550: 10,600 ± 45	12.4		France	?	Boudadi-Maligne et al. 2018

Specimens	Dating of dog remains (Lab. code and uncalibrated result BP [if not stated otherwise])	cal BP (kya)	mtDNA clade	Country	MNI	References
Pleistocene-Holocene (start 11.6 kya) transition						
Saint-Thibaud-de-Couz	LY23/OxA-4404: 10.050 ± 100; 12,027-11,311 cal BP*	11.6		France	1	Chaix 2000
Bedburg		11.6		Germany	1	Street 1991
Shubayqa 6	RTD-9338/Poz-76085/RTD-9341/RTD-9342/ RTD-9343: 10,521-11,933 cal BP	11.5		Jordan	1	Yeomans et al. 2019
Tell Mureybet	LY11.624/11.788/11.787: 9,945-9,905 ± 155 BP*	11.5		Syria	1	Gourichon/Helmer 2008
Ain Mallaha		11.5		Israel	2	Tchernov/Valla 1997; Grosman et al. 2013
Kartstein		11.4	C	Germany	1	Baales 1992
Shillourokambos		11.4		Cyprus	1	Vigne et al. 2011
Grotta Romanelli		11.2	C	Italy	1	Boschin et al. 2020; Calcagnile et al. 2019
Senckenberg-Moor		11.0		Germany	1	Mertens 1936; Degerbøl 1961a

Tab. 1 The oldest known dog specimens worldwide. Dating is non-calibrated as in the original publications (if not stated otherwise). – * indicates different fragments examined or repeat examinations by different laboratories. – MNI: minimum number of indivduals; cal BP: dating result, calibrated Before Present (1950); mtDNA: mitochondrial DNA. – (Table M. Boudadi-Maligne / L. Janssens).

Genetic Dating

Genetic dating has travelled a bumpy road, with early studies placing the dog's origin in awkwardly unrealistic time periods, such as six thousand years ago (Savolainen et al. 2002), which is far more recent than archaeological finds and thus impossible, or 135,000 years ago, which would mean that Neanderthals or Denisovans could have domesticated wolves.

Recent genetic studies are, however, quite consistent and more realistic and report a time frame between 35,000 and 25,000 years ago for the ancestor of today's dogs (Thalmann et al. 2013; Skoglund et al. 2015; Botigué et al. 2017).

Genetic dating is based on DNA differences between the dog and the wolf (the greater the difference, the longer ago they must have split), and it is based on two presumptions:

1) the mutation rate of canine DNA; in other words, the frequency at which mutations occur per nucleotide base pair. The mutation rate of *Canis lupus* is estimated to be ~1 × 10^{-8} per nucleotide, per generation, and
2) the generation time – this defines how long it takes to pass on a surviving mutation to the next generation. Generation time is defined by the first breeding age of an animal, then all the next breeding ages are added, and finally the sum is divided by the number of breeding events. If thus a dog breeds for the first time when one year old (Spotte 2012), then once every year, up to a mean of six years old, the generation time is 3.5 years (1 + 2 + 3 + 4 + 5 + 6 = 21 / 6). The generation time given for dogs was three years in almost all publications (Mech et al. 2017). For wolves, this three-year generation time was also generally used but has been contested (Mech et al. 2017), as wolves on average breed for the first time when four and a half years old. If they then breed yearly for three consecutive years, their generation time would be six years (4.5 + 5.5 + 6.5 + 7.5 = 24 / 4). A more realistic generation time for wolves and dogs taken together would thus better be five years, not three. This difference (five versus three years) will have an influence on the calculations regarding the timing of the dog-wolf split and will place the genetically defined origin of dogs further back in time.

How to Define a Wolf and a Dog?

There are three main differences between dogs and wolves, of which the latter two are of value to archaeologists:

1) non-osteological differences, such as e. g. starch digestion, ear- and tail-carriage, coat colour, eye colour, behaviour, etc. (Cadieu et al. 2009; Axelsson et al. 2013),
2) genetic differences, and
3) osteological (bones and teeth) differences.

Genetic Differences

Genetic studies are possible if DNA can be extracted that is of reliable quality and enough quantity. The results of mtDNA studies (Thalmann et al. 2013; Thalmann/Perri 2018) have established that there are four major dog mtDNA clades: A, B, C and D (Thalmann et al. 2013). In modern dogs, clade A makes up the largest group (two-thirds of all current dogs), but almost all the oldest archaeologically known late Palaeolithic dogs carry the C clade (Hervella et al. 2022). Currently, Y- chromosome and partial and whole genome sequencing studies are becoming increasingly important (Frantz et al. 2016; Bergström et al. 2020; 2022), and progressively more archaeological dog remains will be sequenced, generating a better understanding about the location of origin, dog migration routes and times (Neolithic spread, Bronze Age migrations, etc.).

Osteologic, Morphologic and Morphometric Differences

Methods

In the past, differences between the bones and teeth of wolves and dogs have been evaluated by the following methods: classical morphology (Rütimeyer 1861; 1875; Galton 1865; Nehring 1888; Gaudry/Boule 1892; Wolfgram 1894; Studer 1901), classical morphometry (Germonpré et al. 2009; 2012; 2015; 2017), and Geometric Morphometrics (Drake/Klingenberg 2008; 2010; Drake 2011; Rizk 2012; Schmitt/Wallace 2012; Drake et al. 2015).

Classical morphology looks at form in the following ways: Is the ventral border of the horizontal mandibular ramus straight or convex? In the past it was thought that this border was convex in dogs and straight in wolves. Is the dorsal vertical ramus of the mandible in dogs turned backwards, as it was

claimed to be in *Canis lupus chanco* (Tibetan wolf), or not? Based on the idea that it was curved backwards in dogs, it has been suggested that *chanco* might be the dog's ancestor. Recent genetic research, however, has shown that *chanco* DNA differs significantly from dog DNA.

Classical morphology is only of value if differences are consistent and easily discernible. Such clear differences are not often to be expected between archaeological dogs and wolves, considering they split off genetically only a few thousand years ago.

If obvious morphological differences are dubious or absent in remains, classical morphometry can be used. This is a more elaborate method, in which height, width, diameter, circumference, angle, and length are measured. This can be done on individual structures (e. g. the length of the skull, or the mesiodistal diameter of the mandibular premolar 4 [P4][2]), or on combined structures, such as a partial or entire tooth row length (e. g. rostral maxillary premolar 1 to caudal molar 2 [p1–m2]).

A concern with both morphology and morphometry is that observed differences do not always define a (sub-)species unequivocally. Individuals within a (sub-)species may differ considerably in form or size due to genetic variability, food choice, food supply, climate, geography, gender, social status, and health status (Jolicoeur 1959; Pilot et al. 2012; 2014), yielding an impressive range of morphometric variation, and thus creating a possible morphometric overlap with a related (sub-)species (Terrenato/Ulizzi 1983).

This variability of form and size in *Canis lupus* is enormous as shown by a Geometric Morphometrics (GM) study of the skulls of all 122 canid species (Drake/Klingenberg 2010). The study demonstrates that dogs show the highest variability (not unexpected, considering how very different in form recent breeds can be). But the variability seen in wolf skulls is quite close to that seen in dogs, exemplifying how much variety is present in *Canis lupus*, too. All other canid species show considerably less plasticity.

A (partial) solution to the above problem is to employ ratios (indices), such as e. g. the »skull length versus skull width« ratio, which focuses not on size but on form (as a small ratio will be seen in a short, wide skull, and a high ratio in a long, slender skull). A ratio can confirm species identity even if the size differs greatly (Alaskan wolves can weigh 84 kg, Arabian wolves only 12 kg, but they have the same skull length versus skull width ratio). This is because a ratio does not break the isometry law; skull length and width (both unidimensional) behave isometrically in a species. As a result, their ratio is preserved.

Unfortunately, not all ratios behave isometrically, some behave allometrically (Atchley et al. 1911). Allometry thus modulates and complicates relational-ratio interpretations. To illustrate this with a simple example: a cube with a 1-m-width has a surface of 6 m^2 and its volume is 1 m^3. If its width is 10 m, so ten times as large, its surface is 600 m^2, thus 100 times larger, and its volume 1000 m^3, thus 1000 times as large. Therefore, for instance, if a mid humeral diameter is twice as long in individual B compared to A, its surface will be four times larger in B, not just twice as large.

GM is a computerized, refined method that is used to differentiate when differences are not clearly visible with the naked eye as, for example, the form of a specific tooth. It focuses on »form only« and excludes size and orientation. It uses Procrustes superimposition to arrange comparative specimens to identical size and uses transposition around a centroid (Thompson 1917; Bookstein 1997; Adams et al. 2004).

Two GM methods are predominantly used: 1) the outline method (Lawing/Polly 2010), with landmarks and semi-landmarks, and 2) Fourier analysis (Stein/Weiss 2016).

The method was used with great success for the mandibular molar 1 (M1) in archaeological dogs and wolves and revealed a clear statistical difference between Middle Eastern and European specimens (Pionnier-Capitan 2010). Another GM study of the M1 in Pleistocene and modern wolves indicated that form varies considerably over time. Thus, great care should be taken when comparing modern *Canis lupus* specimens to archaeological ones because conclusions may differ depending on which comparative group is chosen (Boudadi-Maligne 2010). Yet another study (Janssens et al. 2019b) showed that modern mesaticephalic dogs, with skull lengths identical to those of modern wolves, differed significantly in inner ear anatomy (in dogs: smaller centroid size, larger size of lateral semi-circular canal, cochlea streamline length decreased one third of a turn, etc.; see Janssens et al. 2019b). This is certainly a study that should best be repeated with archaeological specimens with an intact *Os petrosum*, to investigate if the same differences were already present in the earliest dogs.

2 Upper case letters are used here for mandibular teeth, lower case letters for maxillary teeth. P/p = premolar; M/m = molar.

Morphological Wolf-Dog Differences Reported in Earlier Literature

1) The backward turning of the dorsal part of the vertical mandibular ramus was reported as typical in dogs and absent in wolves, apart from *Canis lupus chanco,* the Tibetan wolf, concluding that »this subspecies must have been the ancestor of dogs« (Olsen/Olsen 1977; see **fig. 2**).
2) A reduced sagittal crest (the dorsal bony protuberance along the midline skull suture at the level of the parietal bones) was defined in dogs versus wolves (Studer 1901).
3) The size of the tympanic bulla was reported to be larger in wolves than in dogs (Wolfgram 1894; Studer 1901).
4) Tooth crowding, among other dental anomalies, such as tooth rotation, tooth agenesis, or supernumerary teeth, and occlusion pathologies, were reported to be more prevalent in ancient and modern dogs and in zoo wolves (these wolves have been defined as undergoing a nowadays fast domestication phenomenon) compared to ancient and modern wolves (Wolfgram 1894; Studer 1901; Clutton-Brock 1962; Zeuner 1963; Stockhaus 1965; Benecke 1987; 1994; Wobeser 1992). This was explained by mandibular shortening (in the dog), while teeth were assumed to react »conservatively« to the size decrease caused by domestication and thus be »too large for the available space«. This creates, according to that theory, a spatial mismatch between tooth row length and mandibular length (Wolfgram 1894; Benecke 1994).
   Based thereon, the tooth row length (distance between the most rostral margin of the first premolar and the most caudal margin of the last molar) was thought to be shorter in dogs compared to wolves (Wolfgram 1894; Zeuner 1963; Benecke 1987; 1994; Dayan 1994a; 1994b; Clutton-Brock 1995; Morey 2010; Dimitrijević/Vuković 2012; Napierala/Uerpmann 2012). Recently, this criterion was used to discern between two morphotypes of large Pleistocene canids, arguing that those with a shorter tooth row length ratio were »proto dogs« (Germonpré et al. 2015).
   Dogs were also reported to have smaller teeth, specifically the carnassials (defined as the mandibular M1 and the maxillary p4; Clutton-Brock 1962).
   Next, a specific difference in the dental microanatomy of the protocone (one of the several cups of a molar) of the maxillary p4 was reported, with dogs having a protocone, which would be absent in wolves (Napierala/Uerpmann 2012; Camarós et al. 2016).
   Last, a specific dental ratio was proposed to define dogs, this being the mesio-distal diameter of the maxillary p4 compared to the sum of the mesio-distal diameter of the maxillary m1 + m2, with m1 + m2 < p4 claimed to belong to dogs in most cases and m1 + m2 > p4 predominanty to wolves (Clutton-Brock 1962).
5) Dogs were reported to be paedomorphic wolves (having a juvenile puppy-like appearance) (Morey 1994; Waller et al. 2013), which was assumed to be a factor that aided in the domestication process, as paedomorphic appearance is emotionally attractive to humans.
6) Originally, dogs were reported to have larger orbital angles (OA) than wolves (49°–55° in dogs, 39°–46° in wolves; Studer 1901). More recent studies have shown, however, that there is some overlap between both groups (Bockelmann 1920; Iljin 1941; Aaris-Sørensen 1977; see **fig. 3**).
7) Dogs were reported to have a convex ventral horizontal ramus of the mandible, versus a straight mandible in wolves (Lawrence/Reed 1983; Germonpré et al. 2015; see **fig. 4**). In relation to this, a more »massive« mandible was reported in dogs compared to wolves (Clutton-Brock 1962).
8) Dog skulls were reported to have different contact points when positioned on a horizontal plane. Wolf skulls would rest on the canines, dogs on the fourth maxillary premolars, a feature thought to be caused by larger canines and a larger tympanic bulla in wolves (Zeuner 1963; Benecke 1987; see **fig. 5**).
9) Dogs were reported to have a more caudal position of the caudal border of the hard palate, being positioned caudally from a line, in contact with, and connecting both caudal borders of m2. In wolves, the caudal hard palate border would be positioned rostrally from that line (**fig. 6**; see Iljin 1941; Benecke 1987).
10) It was generally accepted that the snout length ratio/index (in some of the literature the word »index« is used for »ratio«) in dogs is smaller than in wolves (Huxley 1880; Nehring 1888; Mertens 1936; Iljin 1941; Degerbøl 1961a; 1961b; Stockhaus 1965; Lawrence/Bossert 1967; Lawrence/Reed 1983; Clutton-Brock 1995; Sablin/Khlopachev 2002; Germonpré et al. 2009; Drake 2011; Horard-Herbin et al. 2014). This ratio is measured differently depending on the study. Measures are generally according to those determined by Von den Driesch (1976). This index divides the length of the skull measured from the prosthion to:
   – the most caudal part of the skull (total length [TL] – measure 1),

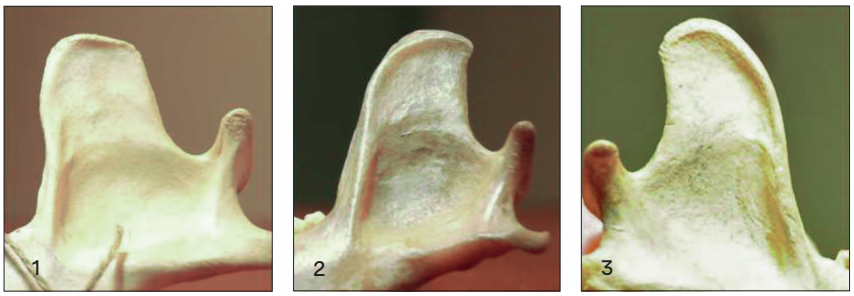

Fig. 2 The straight (**1**) versus backwards (**3**) turning of the dorsal process of the vertical ramus of the mandible of dogs, with (**2**) exemplifying that there are transitional forms which are difficult to classify. – (Photos L. Janssens).

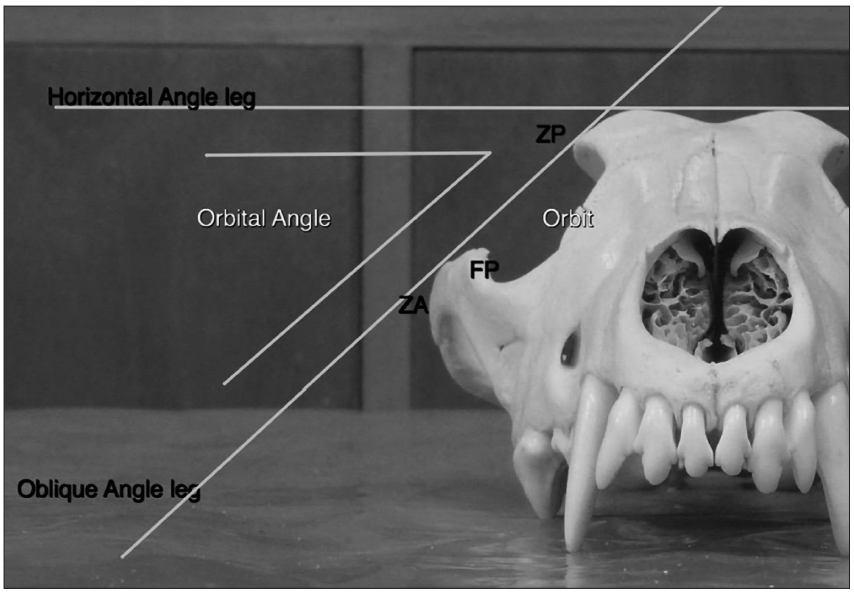

Fig. 3 The orbital angle (OA) is measured viewing the skull from the front. It is the angle between a horizontal line (here shown on top of the frontal skull bones) and an oblique line that touches the zygomatic process (ZP) of the frontal bone and the frontal process (FP) of the zygomatic arch (ZA). – (Photo and graphics L. Janssens).

Fig. 4 The ventral border of the mandible of a dog. This specimen (Bonn-Oberkassel) has a ventral convex border. – (Photo J. Vogel, LVR-LandesMuseum Bonn).

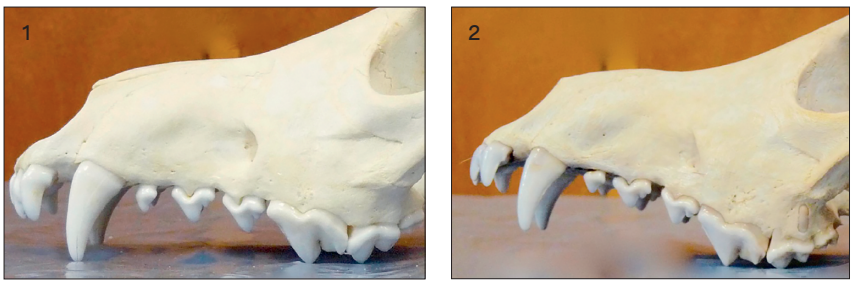

Fig. 5 Two dog specimens documenting the position of the skull on a horizontal plane. **1** stability is obtained by resting on the canines and the p4 or the *bulla tympanica*. – **2** the skull is stabilised by resting on the p4 and the *bulla tympanica*; the canines are not touching the plane. – (Photos L. Janssens).

Fig. 6 Ventral view of the position of the caudal border of the hard palate in two dog specimens. The green line drawn between the caudal side of both maxillary molars 2 is the guideline. The hard palate border can be positioned caudally or rostrally from this line, as shown in the pictures. – (Photos and graphics L. Janssens).

– the ventral central point of the occipital foramen (basal length [BL] – measure 3),
– the caudal part of the condyles (condylobasal length [CbL] – measure 2);

by nasal length measured from the prosthion to:
– the nasion (viscerocranium – measure 8),
– the frontal midpoint (facial length – measure 9),
– the oral borders of the orbits (»snout« length – measure 12),
– the intra-oral staphylon (measure 13).

11) It was generally accepted that the snout width ratio is larger in dogs than in wolves (Huxley 1880; Nehring 1888; Studer 1901; Mertens 1936; Iljin 1941; Degerbøl 1961b; Stockhaus 1965; Lawrence/Bossert 1967; Olsen 1985; Wayne 1986; Morey 1992; Clutton-Brock 1995; Sablin/Khlopachev 2002; Germonpré et al. 2009; Drake 2011; Napierala/Uerpmann 2012; Horard-Herbin et al. 2014). This ratio is calculated by dividing skull length by skull width (measure 34 according to Von den Driesch 1976).
12) In one study, dogs were reported to have a relatively higher snout height and skull height ratio compared to wolves (Pitulko/Kasparov 2017).
13) A relatively smaller brain volume (ratio) was reported in dogs, which is comparable to several studies in other domesticated species (Kruska 1986; 1988a; 1988b). This ratio is calculated by measuring brain volume (measured by filling the brain case with small seeds, mostly millet, then measuring the weight of these and dividing this by the specific gravity of the grains), but more recently volume has been measured by 3D CT or MRI scan technology. Once defined, this volume is divided by a length measure, such as skull length.
14) All of the oldest reported archaeological dog specimens (up to the Bronze Age) have a smaller stature and smaller isometrically related structures (e. g. humerus length) compared to wolves (Rütimeyer 1861; 1875; Mertens 1936; Degerbøl 1961a; Clutton-Brock 1992; Benecke 1994; Dayan 1994a; 1994b; Pluskowski 2006; Boudadi-Maligne 2010; Boudadi-Maligne et al. 2012; Napierala/Uerpmann 2012; Boudadi-Maligne/Escarguel 2014). Almost all Pleistocene and early Holocene dogs have calculated weights of about 14 kg and are about 40–50 cm high at the shoulder (top of scapula). Pleistocene wolves were larger than Holocene specimens (Bergmann's rule; McNab 1971), which should be considered when comparing groups.
15) There are some authors who have published personal interpretations on differences that have never been re-tested nor published in the international peer reviewed literature, and which describe multiple minor differences that are mostly subjective interpretations of specific anatomical landmarks, e. g. the jugular foramen should be wedge-shaped in dogs and arrow-shaped in wolves (Stubbe 1981). These are not reported in this overview.

Signatures (not) Withstanding Critical Analysis

1) Backward turning of the dorsal part of the vertical mandibular ramus?
Our own study (Janssens et al. 2016a) shows that this landmark cannot be used to distinguish

modern dogs from modern wolves, as only 20 % of dogs have turned-back morphology, thus 80 % do not. Four arguments refute the statement of Olsen/Olsen (1977) that *Canis lupus chanco* is the dog's ancestor (based on this specific landmark): first, only 80 % of *chanco* specimens have the turned-back morphology; second, other wolf subspecies also show this morphology (e. g. 12 % of *Canis lupus pallipes*); third, genomic research found *Canis lupus chanco* to be quite distant from the »origin of dog« wolf clade (Sharma et al. 2004) and fourth, as stated before, far from all dogs carry this signature.

2) A reduced sagittal crest in dogs?
   This argument can be rejected as two studies showed that the sagittal crest in some dogs can be larger than that in wolves (Lawrence/Bossert 1967; Rizk 2012).
3) A smaller tympanic bulla in dogs?
   Several studies contradict this statement, as tympanic bulla size seems to be isometrically related to stature/size; thus, large dogs have even larger bullae than wolves (Stockhaus 1965; Drake/Klingenberg 2010; Drake 2011).
4) Dental differences?
   Concerning dental pathology and tooth crowding, in our own study we could not find fewer, or different dental pathologies in wild wolves compared to dogs. Pathologies reported in the veterinary literature as being specifically related to domestication occurred as frequently in wild wolves, thus refuting this widely held prejudice (Janssens et al. 2016b).
   A GM study on a very large number of specimens additionally contradicted the domestication-driven tooth crowding hypothesis and proved that it is Pleistocene wolves that have considerably more crowding than dogs; thus, dogs and wolves cannot be discerned based on this feature (Ameen et al. 2017).
   Tooth row lengths are smaller in dogs because dogs are smaller than wolves, and teeth size and tooth row lengths behave isometrically (Stockhaus 1965). As thus, this signature does not define (sub-)species: it defines only size.
   One study used this parameter as an argument for very early dog domestication (up to 34,000 years ago; Germonpré et al. 2015). This was challenged in our own study (Janssens et al. 2019a): we analyzed the same mandibular and dental lenghts in one modern dog breed using the same methods as in Germonpré et al. (2015). The result was that this dog breed could also be split into two subgroups, based on the same criteria as were used in the original study (Germonpré et al. 2015). This proved that one species – even one breed – can statistically be subdivided, due to anatomical variability, not because of a possible domestication event.
   Dogs generally have smaller teeth than wolves, which is isometrically related to their stature (Stockhaus 1965). Based thereon, the mesio-distal diameter of the maxillary p4 can be used to divide wolves from dogs, as even the largest modern dogs have a smaller maxillary p4 than wolves. A maxillary mesio-distal p4 diameter longer than 22.5 mm can only be from a wolf, while dogs always have diameters smaller than 21.8 mm.
   The mandibular M1 is less useful. A mesio-distal M1 diameter under 22.5 mm belongs to an archaeological dog; between 22.5 mm and 26.9 mm the specimen might be from a dog or a wolf, and above 26.9 mm the tooth belongs to a Pleistocene wolf (Janssens et al. 2019a).
   The dental micro-anatomy of the protocone of the maxillary p4 cannot be used to assign specimens as a wolf or a dog (ancient or modern), as was shown by our own study (Janssens et al. 2019a) of 15 modern Eurasian wolves that all had a protocone. Also, our literature search on Pleistocene wolves (drawings or photos published) showed that most had a protocone. In conclusion, the protocone is not a »dog only« signature, and thus it cannot be used to separate dogs from wolves.
   Considering the mesio-distal diameter of the maxillary p4 compared to the m1 + m2, some studies show that m1 + m2 < p4 is not only encountered in dogs, but that all possible variations of the formula m1 + m2 versus p4 exist in both dogs and wolves (Gaudry/Boule 1892; Wolfgram 1894).
5) Are dogs paedomorphic wolves?
   A recent extensive and very detailed GM study proved this hypothesis to be incorrect; dogs have no paedomorphic traits compared to wolves (Drake/Klingenberg 2010).
6) Is the orbital angle larger in dogs?
   We studied the OA in many different subspecies of modern wolves and in archaeological and modern dogs (Janssens et al. 2016a). In conclusion, the OA can be used to a limited degree to distinguish dogs from wolves. The smallest angle measured was 28° (wolf), the widest angle was 72° (Border Collie; **fig. 7**). Angles above 60° belong to modern dogs only, and angles under 35° can with certainty be attributed to wolves. Angles between 35° and 60° can belong to dogs or wolves. However, the mean OA of wolves is smaller than that of dogs (42° and 55°, respectively). Neolithic dogs have a mean angle of 47° (range 35°–50°) and are thus embedded in the modern wolf range (28°–52°).

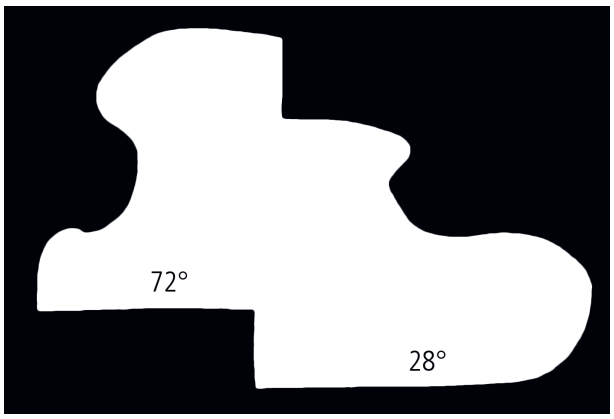

Fig. 7 Drawing of a transverse cut through the skull at the rostral orbit (see **fig. 3**), showing the widest OA measured, which is 72° in a dog, and the smallest OA measured, which is 28° in a wolf. The drawing also shows the expansion of the orbital area in a dorso-lateral direction (expanded in dogs compared to wolves). – (Drawing L. Janssens).

Only a few OA data are available from ancient wolves. These are larger on average (44°) than those of modern wolves (42°; see Aaris-Sørensen 1977).

In conclusion, our results show that the mean OA increased from 42° in ancient wolves to 44° in modern wolves, to 47° in Neolithic dogs, and to 55° in modern dogs.

A larger OA in dogs results from the bony expansion around the orbit, based on: 1) the lateralization of the frontal process of the zygomatic arch in dogs (Schmitt/Wallace 2012); 2) the maxillary skull widening at the level of the first molar; 3) the rostral and dorsal expansion of the frontal bones (leading to stop formation in dogs – the angle between nasal and frontal bones, seen from a lateral view); and 4) the widening of the orbital region (Drake et al. 2015).

Interestingly, the OA shows a more fluctuating asymmetry (the difference between the OA on the left and right side) in Neolithic dogs than in modern ones, with wolves' being the most symmetrical. This agrees well with the evolutionary development of the three groups, with the longest existing species being the most symmetrical (wolves are estimated to have originated 400,000 years ago) and newly developing species having more asymmetry. Thus, Neolithic dogs were the most asymmetrical, as they were an emerging newly developing species, and as asymmetry tends to stabilize over time, modern dogs are thus already a little more symmetrical (Janssens et al. 2016a).

7) Do dogs have more massive mandibles and a convex ventral border?

Most studies that report on massive mandibles in dogs suffer from a paucity of specimens, or from conflicting results. Mandible form, mass, width, height, and length were studied recently with GM in a large group of canine specimens (Drake et al. 2015) and no difference was found between wolves and dogs. Thus, this trait cannot be used as a discerning parameter.

Mandible form, including the convexity of the ventral border, was also examined in a large group of canids with the GM landmark method (Drake et al. 2015), and although a statistical difference between dogs and wolves existed in modern skulls, no such difference could be found in archaeological specimens.

8) Are the contact points of the skull on a horizontal plane different in dogs?

In our own study (Janssens et al. 2019a) of more than 200 specimens of modern dogs and modern wolves, we observed considerable species overlap, with about 50 % of both wolf and dog skulls resting on the the first maxillary molars, the other 50 % on the canines. So, this test cannot discern dogs from wolves.

9) Do dogs have a more caudal position of the caudal hard palate border?

From our own study (Janssens et al. 2019a), we concluded that there is a trend, with wolves having a rostrally placed caudal border significantly more often ($p < 0.0001$).

In modern dogs, the »expected« caudal hard palate border is present in only 58 %. Thus, 42 % of dogs do not have the expected caudal border. In modern wolves, the »expected« rostrally placed border is present in only 69 %. Thus, 31 % of wolves do not have the expected morphology. Neolithic dogs have a rostral hard palate border in 81 % of cases (they are thus more wolf-like). In conclusion, this landmark cannot separate individual dog and wolf specimens.

10) Is the snout length ratio of dogs smaller than that of wolves?

Recently, the snout length ratio of more than 500 ancient and modern wolves and dogs was studied (Janssens et al. 2019a). The conclusion is that modern (mesaticephalic) dogs do not have a significantly smaller snout index than modern wolves. However, modern dogs and wolves have a statistically greater snout index than their archaeological/fossil counterparts.

We were not the first to report the lack of snout shortening in dogs. Two important earlier large-scale studies also reported this (Wayne 1986; Morey 1992). Yet these results have seemingly been ignored, and the tendency to use this parameter as a distinctive landmark persists (see Sablin/Khlopachev 2002; Germonpré et al. 2009).

11) Is the snout width ratio of dogs larger than that of wolves?

In our study (Janssens et al. 2019a) we concluded that snout width ratio does differ significantly between ancient wolves and ancient dogs, with dogs having a relatively wider snout.

The wider dog snout is the consequence of a mid-face shape change, which is maximal at the transversal plane in the carnassial region. These changes are driven, at least in part, by the allelic composition and expression of the *Runx2* gene. A hyperactive allelic variant enhances dorsal and lateral maxillary bone growth, imposing adaptations on surrounding skull bones (Fondon/Garner 2006).

12) Is the snout and skull height ratio of dogs larger than that of wolves?

The snout and skull height ratio of more than 100 specimens were re-studied after Pitulko/Kasparov 2017 (Janssens et al. 2019a). In conclusion, there is considerable overlap in the snout height ratio between wolves (0.16–0.18) and dogs (0.13–0.25). A ratio below 0.16 or above 0.18 certainly belongs to a dog. Also, mean dog and wolf values differ significantly (both in modern and archaeological specimens).

The skull height ratio did not differ significantly between ancient wolves and ancient dogs. However, in modern specimens it did, indicating that modern wolves and dogs are separated from one another to a greater degree than their ancient counterparts.

13) Is relative brain volume reduced in the dog?

A 25–30 % smaller brain-size was repeatedly reported in dogs versus wolves in the literature (Stockhaus 1965; Belyaev et al. 1985; Arbuckle 2005; Zeder 2012). This size reduction is mainly caused by the smaller size of specific brain stress centres (Nehring 1888; Stockhaus 1965; Olsen/Olsen 1977; Nobis 1981; Olsen 1985; Morey 1992; 2010; Hemmer 2005; Healy/Rowe 2006; Zeder 2012), such as the hypothalamus and the reticulo-activated system (RAS) in the metencephalon (Kruska 1988a; 1988b; O'Regan/Kitchener 2005; Zeder 2012). These centres reduce in size in all domesticates and document the considerably less stressful anthropogenic environment (Arbuckle 2005; Hemmer 2005).

14) Are dogs small wolves?

Based on very many studies, it is well accepted that dogs are generally smaller and have isometrically related smaller body parts (e. g. the femur) when compared to wolves (Rütimeyer 1861; 1875; Mertens 1936; Degerbol 1961a; Clutton-Brock 1992; Dayan 1994a; 1994b; Pluskowski 2006; Boudadi-Maligne 2010; Boudadi-Maligne et al. 2012; Napierala/Uerpmann 2012; Boudadi-Maligne/Escarguel 2014). The earliest dogs probably weighed around 14 kg and had a shoulder height of 45 cm, which is roughly 40–60 % smaller than most wolves (*Canis lupus arabs* being the exception, but genetic research points out that this subspecies is not very close to the dog's origin clade). Neolithic dogs from the Alpine lakes and from Scandinavia are even smaller, being comparable to present-day toy-poodles. Larger dogs only started to emerge in the Bronze Age (Horard-Herbin et al. 2014). In conclusion: yes, dogs are anatomically small wolves (apart from some giant modern breeds).

Conclusions

To study and discern bone- and tooth-related differences between modern and archaeological wolves and dogs, three points are important from the start:

1) Brachycephalic and dolichocephalic dog skulls and achondroplastic dog skeletons are not relevant to the study of dog domestication because all early dogs were mesaticephalic, as are all wolves. Yet in some recent (mainly GM) studies, these cephalic variants were used, which cannot produce sound conclusions (Schweizer et al. 2017).

2) It is important to realise that Final Pleistocene wolves were anatomically different in size and morphology to modern wolves: they were larger and sturdier probably due to Bergmann's rule. But was that also the case for the original wolf clade from which dogs originated? We do not know, as very few Final Pleistocene wolves from East Asia have been examined, which has created a considerable void.

3) The reported wolf-dog differences should not be seen as isolated phenomena: they are part of one global morphology-size change; dogs get smaller and, in that process, they experience progenesis (early production of sex hormones) with earlier and different closing times of growth plates. This then creates skull differences, mainly around the orbital area.

The criteria listed below are the ones that withstand critical analysis; some are related to size, others are not. Together, they can be of great diagnostic value if used in multivariate analyses.

Differences related to size reduction are important:

- Dogs and wolves can be separated at the extremes of the mandibular M1 mesio-distal diameter,

- dogs have an absolute shorter maxillary p4 mesiodistal diameter, there is no overlap in dogs and wolves, and
- the bones of the appendicular and axial skeleton, as well as the mandibles and the skull, are smaller in dogs than in wolves, and they can be used to calculate body mass and shoulder height (using specific formulas).

Differences related to facial morphology include:
- Dogs have a wider mean snout width index,
- dogs have a higher mean snout height index and this index can be diagnostic at its extremes, and
- dogs have a wider mean OA and this can be diagnostic at its extremes.

Differences related to the brain are also to be mentioned:
- Dogs have a smaller brain size ratio than wolves, and
- (modern) dogs have specific inner ear measurements that differ from those in wolves.

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Bibliography

Aaris-Sørensen 1977: K. Aaris-Sørensen, The subfossil wolf, *Canis lupus* L. in Demark. Videnskabelige Meddel. Dansk Naturhist. Forening Kjøbenhavn 140, 1977, 129–146.

Adams et al. 2004: D. C. Adams / F. J. Rohlf / D. E. Slice, Geometric morphometrics: ten years of progress following the »revolution«. Italian Journal Zool. 71(1), 2004, 5–16.

Altuna et al. 1984: J. Altuna / A. Baldeon / K. Mariezkurrena, Dépôts rituels magdaléniens de la grotte d'Erralla (Pays Basque). Munibe 36, 1984, 3–10.

Ameen et al. 2017: C. Ameen / A. Hulme-Beaman / A. Evin / M. Germonpré / K. Britton / T. Cucchi / G. Larson / K. Dobney A landmark-based approach for assessing the reliability of mandibular tooth crowding as a marker of dog domestication. Journal Arch. Scien. 85, 2017, 41–50.

Anderson et al. 2009: T. M. Anderson / B. M. VonHoldt / S. I. Candille / M. Musiani / C. Greco / D. R Stahler / D. W. Smith / B. Padhukasahasram / E. Randi / J. A. Leonard / C. D. Bustamante / E. A. Ostrander / H. Tang / R. K. Wayne / G. S Barsh, Molecular and evolutionary history of melanism in North American gray wolves. Science 323(5919), 2009, 1339–1343.

Arbuckle 2005: B. S. Arbuckle, Experimental animal domestication and its application to the study of animal exploitation in prehistory. In: J.-D. Vigne / J. Peters / D. Helmer (eds), First Steps of Animal Domestication. New archaeozoological approaches. Proc. 9th Conf. Internat. Council Archaeozool., Durham, August 2002 (Oxford 2005) 18–33.

Atchley 1911: W. Atchley, Ratios and the statistical analysis of biological data. Systematic Zool. 26, 1911, 71–78.

Axelsson et al. 2013: E. Axelson / A. Ratnakumar / M.-L. Arendt / K. Maqbool / M. T. Webster / M. Perloski / O. Liberg / J. M. Arnemo / A. Hedhammar / K. Lindblad-Toh, The genomic signature of dog domestication reveals adaptation to a starch-rich diet. Nature 495(7441), 2013, 360–364.

Baales 1992: M. Baales, Überreste von Hunden aus der Ahrensburger Kultur am Karstein, Nordeifel. Arch. Korrbl. 22, 1992, 461–471.

Belyaev et al. 1985: D. Belyaev / I. Plyusnina /L. Trut, Domestication in the silver fox (*Vulpes Fulvus Desm*): Changes in physiological boundaries of the sensitive period of primary socialization. Applied Animal Behavioral Scien. 13(4), 1985, 359–370.

Benecke 1987: N. Benecke, Studies on early dog remains from Northern Europe. Journal Arch. Scien. 14(1), 1987, 31–49.

1994: N. Benecke, Archäozoologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südskandinavien von den Anfngen bis zum ausgehenden Mittelalter. Schr. Ur- Frühgesch. 64 (Berlin 1994).

Bergström et al. 2020: A. Bergström / L. Frantz / R. Schmidt / E. Ersmark / O. Lebrasseur / L. Girdland-Flink / A. T. Lin / J. Storå / K.-G. Sjögren / D. Anthony / E. Antipina / S. Amiri / G. Bar-Oz / V. I. Bazaliiskii / J. Bulatović / D. Brown / A. Carmagnini / T. Davy / S. Fedorov / I. Fiore / D. Fulton / M. Germonpré / J. Haile / E. K. Irving-Pease / A. Jamieson / L. Janssens / I. Kirillova / L. Kolska Horwitz / J. Kuzmanovic-Cvetkovic / Y. Kuz-

min / R. J. Losey / D. Ložnjak Dizdar / M. Mashkour / M. Novak / V. Onar / D. Orton / M. Pasarić / M. Radivojević / D. Rajković / B. Roberts / H. Ryan / M. Sablin / F. Shidlovskiy / I. Stojanović / A. Tagliacozzo / K. Trantalidou / Inga Ullén / A. Villaluenga / P. Wapnish / K. Dobney / A. Götherström / A. Linderholm / L. Dalén / R. Pinhasi / G. Larson / P. Skoglund, Origins and genetic legacy of prehistoric dogs. Science 370(6516), 2020, 557–564. DOI: 10.1126/science.aba9572.

2022: A. Bergström / D. W. G. Stanton / U. H. Taron / L. Frantz / M.-H. S. Sinding / E. Ersmark / S. Pfrengle / M. Cassatt-Johnstone / O. Lebrasseur / L. Girdland-Flink / D. M. Fernandes / M. Ollivier / L. Speidel / S. Gopalakrishnan / M. V. Westbury / J. Ramos-Madrigal / T. R. Feuerborn / E. Reiter / J. Gretzinger / S. C. Münzel / P. Swali / N. J. Conard / Ch. Carøe / J. Haile / A. Linderholm / S. Androsov / I. Barnes / Ch. Baumann / N. Benecke / H. Bocherens / S. Brace / R. F. Carden / D. G. Drucker / S. Fedorov / M. Gasparik / M. Germonpré / S. Grigoriev / P. Groves / S. T. Hertwig / V. V. Ivanova / L. Janssens / R. P. Jennings / A. K. Kasparov / I. V. Kirillova / I. Kurmaniyazov / Y. V. Kuzmin / P. A. Kosintsev / M. Lázničková-Galetová / Ch. Leduc / P. Nikolskiy / M. Nussbaumer / C. O'Drisceoil / L. Orlando / A. Outram / E. Y. Pavlova / A. R. Perri / M. Pilot / V. V. Pitulko / V. V. Plotnikov / A. V. Protopopov / A. Rehazek / M. Sablin / A. Seguin-Orlando / J. Storå / Ch. Verjux / V. F. Zaibert / G. Zazula / Ph. Crombé / A. J. Hansen / E. Willerslev / J. A. Leonard / A. Götherström / R. Pinhasi / V. J. Schuenemann / M. Hofreiter / M. Th. P. Gilbert / B. Shapiro / G. Larson / J. Krause / L. Dalén / P. Skoglund, Grey wolf genomic history reveals a dual ancestry of dogs. Nature 607, 2022, 313–320. DOI: 10.1038/s41586-022-04824-9.

Bockelmann 1920: H. Bockelmann, Untersuchungen an Wolfsbastarden nach Züchtungsversuchen im Haustiergarten zu Halle a. S. [Diss. Univ. Halle/S. 1920].

Bökönyi 1975: S. Bökönyi, Vlasac: an early site of dog domestication. In: A. T. Clason (ed.), Archaeozoological Studies (Amsterdam 1975) 167–178.

Bookstein 1997: F. L. Bookstein, Morphometric Tools for Landmark Data: Geometry and Biology (Cambridge 1997).

Boschin et al. 2020: F. Boschin / F. Bernardini / E. Pilli, The first evidence for Late Pleistocene dogs in Italy. Scien. Reports 10, 2020: 13313. DOI: 10.1038/s41598-020-69940-w.

Botigué et al. 2017: L. R. Botigué / S. Song / A. Scheu / S. Gopalan / A. L. Pendleton / M. Oetjens / A. M. Taravella / T. Seregély / A. Zeeb-Lanz / R.-M. Arbogast / D. Bobo / K. Daly / M. Unterländer / J. Burger / J. M. Kidd / K. R. Veeramah, Ancient European dog genomes reveal continuity since the early Neolithic. Nature Commun. 8, 2017. DOI: 10.1038/ncomms16082.

Boudadi-Maligne 2010: M. Boudadi-Maligne, Les Canis pleistocenes du sud de la France: approche biosystematique, evolutive et biochronologique [Diss. Univ. Bordeaux 2010].

Boudadi-Maligne/Escarguel 2014: M. Boudadi-Maligne / G. Escarguel, A biometric re-evaluation of recent claims for Early Upper Paleolithic wolf domestication in Eurasia. Journal Arch. Scien. 45, 2014, 80–89.

Boudadi-Maligne et al. 2012: M. Boudadi-Maligne / J.-B. Mallye / M. Langlais / C. Barshay-Szmidt, Des restes de chiens magdaléniens à l'abri du Morin (Gironde, France). Implications socio-économiques d'une innovation zootechnique. PALEO. Revue d'Arch. Préhist. 23, 2012, 39–54.

2018: M. Boudadi-Maligne / P. Bonnet-Jaquement / M. Langlais /J. G. Ferrié, Les chiens de Pont d'Ambon: Statut, contexte et implications sociétales. In: A. Averbouh / J. Cleyet- Merle / P. Bonnet-Jacquement (eds), L'Aquitaine à la fin des temps glaciaires. Les sociétés de la transition du Mésolithique dans l'espace Nord Aquitain. En Hommage à Guy Célérier. Paléo num. sp. 2018, 67–76. https://hal.archives-ouvertes.fr/hal-02265193.

Brown et al. 2017: E. A. Brown / P. J. Dickinson / T. Mansour / B. K. Sturges / M. Aguilar / A. Young / C. Korff / J. Lind / C. L. Ettinger / S. Varon / R. Pollard / C. T. Brown / T. Raudsepp / D. L. Bannasch, FGF4 retrogene on CFA12 is responsible for chondrodystrophy and intervertebral disc disease in dogs. Proc. Nat. Acad. Scien. 2017. DOI: 10.1073/pnas.1709082114.

Cadieu et al. 2009: E. Cadieu / M. W. Neff / P. Quignon / K. Walsh / K. Chase / H. G. Parker / B. M. Vonholdt / A. Rhue / A. Boyko / A. Byers / A. Wong / D. S. Mosher / A. G. Elkahloun / T. C. Spady / C. André / K. G. Lark / M. Cargill / C. D. Bustamante / R. K. Wayne / E. A. Ostrander, Coat variation in the domestic dog is governed by variants in three genes. Science 326(5949), 2009, 150–153.

Calcagnile et al. 2019: L. Calcagnile / I. Mazzini / F. Giustini / M. Brilli, New radiocarbon dating results from the Upper Palaeolithic-Mesolithic levels in Grotta Romanelli (Apulia, Southern Italy). Radiocarbon 61, 2019, 1211–1220. DOI: 10.1017/RDC.2019.8.

Camarós et al. 2016: E. Camarós / S. C. Münzel / M. Cueto / F. Rivals / N. J. Conard, The evolution of Paleolithic hominin-carnivore interaction written in teeth: Stories from the Swabian Jura (Germany). Journal Arch. Scien.: Reports 6, 2016, 798–809.

Chaix 2000: L. Chaix, A preboreal dog from the northern Alps (Savoie, France). In: S. J. Crockford (ed.), Dogs through Time – An Archaeological Perspective. BAR Internat. Ser. 889 (Oxford 2000) 49–60.

Clutton-Brock 1962: J. Clutton-Brock, Near Eastern canids and the affinities of the Natufian dogs. Zeitschr. Tierzüchtung u. Züchtungsbiol. 76, 1962, 326–333.

1963: J. Clutton-Brock, The origins of the dog. In: D. Brothwell / E. Higgs (eds), Science in Archaeology (New York 1963) 269–274.

1995: J. Clutton-Brock, Origins of the dog: domestication and early history. In J. Serpell (ed.), The Domestic Dog: Its Evolution, Behaviour and Interactions with People (Cambridge 1995) 7–20.

Darwin 1868: C. R. Darwin, Variation of Plants and Animals under Domestication 2 (London 1868).

Dayan 1994a: T. Dayan, Carnivore diversity in the Late Quaternary of Israel. Quaternary Research 41(3), 1994, 343–349.

1994b: T. Dayan, Early domesticated dogs of the Near East. Journal Arch. Scien. 21(5), 1994, 633–640.

Degerbøl 1961a: M. Degerbøl, On a find of a Preboreal domestic dog *Canis familiaris* L. from Star Carr, Yorkshire, with remarks on other Mesolithic dogs. Proc. Prehist. Soc. N. S. 27, 1961, 35–55.

1961b: M. Degerbøl, Der Hund, das älteste Haustier Dänemarks. Zeitschr. Tierzüchtung u. Züchtungsbiol. 76 (1–4), 334–341.

Dimitrijević/Vuković 2012: V. Dimitrijević / S. Vuković, Was the dog locally domesticated in the Danube Gorges? Morphometric study of dog cranial remains from four Mesolithic-Early Neolithic archaeological sites by comparison with contemporary wolves. Internat. Journal Osteoarch. 22(1), 2012, 12–34.

Drake 2011: A. G. Drake, Dispelling dog dogma: an investigation of heterochrony in dogs using 3D geometric morphometric analysis of skull shape. Evolution Development 13(2), 2011, 204–213.

Drake/Klingenberg 2008: A. G. Drake / C. P. Klingenberg, The pace of morphological change: historical transformation of skull shape in St Bernard dogs. Proc. Royal Soc., Ser. B: Biol. Scien. 275(1630), 2008, 71–76.

2010: A. G. Drake / C. P. Klingenberg, Large-scale diversification of skull shape in domestic dogs: disparity and modularity. The American Naturalist 175(3), 2010, 289–301.

Drake et al. 2015: A. G. Drake / M. Coquerelle / G. Colombeau, 3D morphometric analysis of fossil canid skulls contradicts the suggested domestication of dogs during the late Paleolithic. Scientific Reports 5, 2015. DOI: 10.1038/srep08299.

Von den Driesch 1976: A. von den Driesch, A Guide to the Measurement of Animal Bone from Archaeological Sites. Peabody Mus. Bull. 1 (Harvard 1976).

Fondon/Garner 2007: J. W. Fondon / H. R. Garner, Detection of length-dependent effects of tandem repeat alleles by 3-D geometric decomposition of craniofacial variation. Development Genes and Evolution 217(1), 2007, 79–85.

Frantz et al. 2016: L. A. Frantz / V. E. Mullin / M. Pionnier-Capitan / O. Lebrasseur / M. Ollivier / A. Perri / A. Linderholm / V. Mattiangeli / M. D. Teasdale / E. A. Dimopoulos / A. Tresset / M. Duffraisse / F. McCormick / L. Bartosiewicz / E. Gál / É. A. Nyerges / M. V. Sablin / S. Bréhard / M. Mashkour / A. Bălăşescu / B. Gillet / S. Hughes / O. Chassaing / Ch. Hitte / J.-D. Vigne / K. Dobney / C. Hänni / D. G. Bradley / G. Larson, Genomic and archaeological evidence suggest a dual origin of domestic dogs. Science 352(6290), 2016, 1228–1231.

Freedman et al. 2014: A. H. Freedman / I. Gronau / R. M. Schweizer /D. Ortega-Del Vecchyo / E. Han / P. M. Silva / M. Galaverni / Z. Fan / P. Marx / B. Lorente-Galdos / H. Beale / O. Ramirez / F. Hormozdiari / C. Alkan / C. Vilà / K. Squire / E. Geffen / J. Kusak / A. R. Boyko / H. G. Parker / C. Lee / V. Tadigotla / A. Siepel / C. D. Bustamante / T. T. Harkins / S. F. Nelson / E. A. Ostrander / T. Marques-Bonet / R. K. Wayne / J. Novembre, Genome sequencing highlights the dynamic early history of dogs. PloS Genetics 10(1), 2014. DOI: 10.1371/journal.pgen.1004016.

Galton 1865: F. Galton, The first steps towards the domestication of animals. Transact. Ethnol. Soc. London 3, 1865, 122–138.

Gaudry/Boule 1892: A. Gaudry / M. Boule, Les oubliettes de Gargas. Mat. Hist. Temps Quaternaires 4, 1892, 130.

Germonpré et al. 2009: M. Germonpré / M. V. Sablin / R. E. Stevens / R. E. M. Hedges / M. Hofreiter / M. Stiller / V. R. Després, Fossil dogs and wolves from Paleolithic sites in Belgium, the Ukraine and Russia: osteometry, ancient DNA and stable isotopes. Journal Arch. Scien. 36(2), 2009, 473–490.

2012: M. Germonpré / M. Lázničková-Galetová / M. V. Sablin, Paleolithic dog skulls at the Gravettian Předmostí site, the Czech Republic. Journal Arch. Scien. 39(1), 2012, 184–202.

2015: M. Germonpré / M. Lázničková-Galetová / R. J. Losey / J. Raikkönen / M. V. Sablin, Large canids at the Gravettian Předmostí site, the Czech Republic: the mandible. Quaternary Internat. 359, 2015, 261–279.

2017: M. Germonpré / S. Fedorov / P. Danilov / P. Galeta / E.-L. Jimenez / M. Sablin / R. J. Losey, Paleolithic and prehistoric dogs and Pleistocene wolves from Yakutia: Identification of isolated skulls. Journal Arch. Scien. 78, 2017, 1–19.

Gojobori et al. 2021: J. Gojobori / N. Arakawa / X. Xiayire / Y. Matsumoto / S. Matsumura / H. Hongo / N. Ishiguro / Y. Terai, The Japanese wolf is most closely related to modern dogs and its ancestral genome has been widely inherited by dogs throughout East Eurasia. bioRxiv 2021 = Nature Comm. 15, 2024. DOI: 10.1038/s41467-024-46124-y.

Gourichon/Helmer 2008: L. Gourichon / D. Helmer, Étude archéozoologique de Mureybet. In: J. J. Ibañez (ed.), Tell Mureybet, un site néolithique dans le Moyen Euphrate syrien. En Hommage a Jacques Cauvin, Vol. I & II. Maison de l'Orient et de la Méditerranée. BAR Internat. Ser. 1843 (Oxford 208) 115–227.

Gray et al. 2010: M. M. Gray / N. B. Sutter / E. A. Ostrander / R. K. Wayne, The IGF1 small dog haplotype is derived from Middle Eastern grey wolves. BMC Biol. 8(1), 2010, 16.

Grosman 2013: L. Grosman, The Natufian chronology scheme – New insights and their implications for Natufian foragers in the levant. In: O. Bar-Yosef / F. Valla (eds), Terminal Pleistocene Social Changes in Western Asia. Internat. Monogr. Prehist., Arch. Ser. 19 (Ann Arbor 2013) 622–638.

Healy/Rowe 2006: S. D. Healy / C. Rowe, A critique of comparative studies of brain size. Proc. Royal Soc., Ser. B: Biol. Scien. 274, 2006, 453–464.

Hemmer 2005: H. Hemmer, Neumühle-Riswicker Hirsche – Erste planmäßige Zucht einer neuen Nutztierform. Naturwiss. Rundschau 58, 2005, 255–261.

Hervella et al. 2022: M. Hervella / A. San-Juan No / A. Aldasoro-Zabala / K. Mariezkurrena / J. Altuna / C. de-la-Rua, The domestic dog that lived ~17,000 years ago in the Lower Magdalenian of Erralla site (Basque Country): A radiometric and genetic analysis. Journal Arch. Scien.: Reports 46, 2022. DOI: 10.1016/j.jasrep.2022.103706.

Horard-Herbin et al. 2014: M.-P. Horard-Herbin / A. Tresset / J.-D. Vigne, Domestication and uses of the dog in western Europe from the Paleolithic to the Iron Age. Animal Frontiers 4(3), 2014, 23–31.

Huxley 1880: T. H. Huxley, On the Cranial and Dental Characters of the Canidæ. Proc. Zool. Soc. London 1880, 238–288.

Iljin 1941: N. A.Iljin, Wolf-dog genetics. Journal of Genetics 42(3), 1941, 359–414.

Janssens et al. 2016a: L. Janssens / I. Spanoghe / R. Miller / S. van Dongen, Can orbital angle morphology distinguish dogs from wolves? Zoomorphology 135, 2016, 149–158.

2016b: L. Janssens / L. Verhaert / D. Berkowic / D. Adriaens, A standardized framework for examination of oral lesions in wolf skulls (Carnivora: Canidae: *Canis lupus*). Journal of Mammalogy 97(4), 2016, 1111–1124. DOI: 10.1093/jmammal/gyw058.

2018: L. A. Janssens / L. Giemsch / R. Schmitz / M. Street, A new look at an old dog: Bonn-Oberkassel reconsidered. Journal Arch. Scien. 92, 2018, 126–138.

2019a: L. Janssens / A. Perri / P. Crombé / S. van Dongen / D. Lawler, An evaluation of classical morphologic and morphometric parameters reported to distinguish wolves and dogs. Journal Arch. Scien.: Reports 23, 2019, 501–533.

2019b: L. Janssens / P. Gunz / T. Stenger / M. Fischer / M. Boone / A. Stoessel, Bony labyrinth shape differs distinctively between modern wolves and dogs. Zoomorphology 138, 2019, 409–417. DOI: 10.1007/s00435-019-00445-5.

Jolicoeur 1959: P. Jolicoeur, Multivariate geographical variation in the wolf *Canis lupus*. Evolution 13(3), 1959, 283–299.

Klütsch/de Caprona 2010: C. F. Klütsch / M. D. C. de Caprona, The IGF1 small dog haplotype is derived from Middle Eastern grey wolves: a closer look at statistics, sampling, and the alleged Middle Eastern origin of small dogs. BMC Biol. 8(1), 2010, 119.

Klütsch/Savolainen 2011: C. F. Klütsch / P. Savolainen, Geographical origin of the domestic dog. eLS 2011. DOI: 10.1002/9780470015902.a0022867.

Kruska 1986: D. Kruska, How fast can total brain size change in mammals? Journal Hirnforsch. 28(1), 1986, 59–70.

1988a: D. Kruska, Effects of domestication on brain structure and behavior in mammals. Human Evolution 3(6), 1988, 473–485.

1988b: D. Kruska, Mammalian domestication and its effect on brain structure and behaviour. In: H. J. Jerison / I. Jerison (eds), Intelligence and Evolutionary Biology. NATO ASI Ser. 17 (Berlin, Heidelberg 1988) 211–250. DOI: 10.1007/978-3-642-70877-0_13.

Larson/Burger 2013: G. Larson / J. Burger, A population genetics view of animal domestication. Trends in Genetics 29(4), 2013, 197–205.

Larson et al. 2012: G. Larson / E. K. Karlsson / A. Perri / K. Lindblad-Toh, Rethinking dog domestication by integrating genetics, archaeology, and biogeography. Proc. Nat. Acad. Scien. 109(23), 2012, 8878–8883.

Lawing/Polly 2010: A. M. Lawing / P. D. Polly, Geometric morphometrics: recent applications to the study of evolution and development. Journal Zool. 280(1), 2010, 1–7.

Lawrence/Bossert 1967: B. Lawrence / W. H. Bossert, Multiple character analysis of *Canis lupus, latrans,* and *familiaris*, with a discussion of the relationships of *Canis niger*. American Zool. 7(2), 1967, 223–232.

Lawrence/Reed 1983: B. Lawrence / C. A. Reed, The dogs of Jarmo. In: L. S. Braidwood / R. J. Braidwood / C. A. Howe Reed / P. J. Watson (eds), Prehistoric Archaeology along the Zagros Flanks. Univ. Chicago Orient. Inst. Publ. 105 (Chicago 1983) 485–489.

Leesch/Müller 2012: D. Leesch / W. Müller, Neue Radiokarbondaten an Knochen, Zähnen und Geweih aus einigen Magdalénien-Fundstellen der Schweiz und ihre Bedeutung für die Stellung des Magdalénien innerhalb des Spätglazials. Jahrb. Arch. Schweiz 95, 2012, 117–126.

Lindblad-Toh et. Al. 2005: K. Lindblad-Toh / C. M. Wade / T. S. Mikkelsen / E. K. Karlsson / D. B. Jaffe / M. Kamal / M. Clamp / J. L. Chang / E. J. Kulbokas III / M. C. Zody / E. Mauceli / X. Xie / M. Breen / R. K. Wayne / E. A. Ostrander / C. P. Ponting / F. Galibert / D. R. Smith / P. J. de Jong / E. Kirkness / P. Alvarez / T. Biagi / W. Brockmann / J. Butler / C.-W. Chin / A. Cook / J. Cuff / M. J. Daly / D. DeCaprio / S. Gnerre / M. Grabherr / M. Kellis / M. Kleber / C. Bardeleben / L. Goodstadt / A. Heger / C. Hitte / L. Kim / K.-P. Koepfli / H. G. Parker / J. P. Pollinger / S. M. J. Searle / N. B. Sutter / R. Thomas / C. Webber / Broad Sequencing Platform Members / E. S. Lander, Genome sequence, comparative analysis and haplotype structure of the domestic dog. Nature 438(7069), 2005, 803.

Lorenz 1954: K. Lorenz, Man Meets Dog (London 1954).

McNab 1971: B. K. McNab, On the Ecological Significance of Bergmann's Rule. Ecology 52, 1971, 845–854.

Mech et al. 2017: L. D. Mech / S. Barber-Meyer / J. Erb, Wolf (*Canis lupus*) generation time and proportion of current breeding females by age. PloS ONE 11(6), 2017. DOI: 10.1371/ journal.pone.0156682.

Mertens 1936: R. Mertens. Der Hund aus dem Senckenberg-Moor, ein Begleiter des Urs. Natur u. Volk 66, 1936, 506–510.

Morel et al. 1997: P. Morel / W. Müller / D. Leesch / A. Burke, Un campement magdalénien au bord du lac de Neuchâtel: étude archéozoologique (secteur 1). Arch. Neuchâteloise 23 (Neuchâtel 1997).

Morey 1992: D. F. Morey, Size, shape and development in the evolution of the domestic dog. Journal Arch. Scien. 19, 1992, 181–204.

1994: D. F. Morey, The early evolution of the domestic dog. Am. Scientist 82, 1994, 336–347.

2010: D. F. Morey, Dogs: Domestication and the Development of a Social Bond (Cambridge 2010).

Napierala/Uerpmann 2012: H. Napierala / H. P. Uerpmann, A »new« Palaeolithic dog from Central Europe. Internat. Journal Osteoarch. 22(2), 2012, 127–137.

Nehring 1888: A. Nehring, Zur Abstammung der Hunde-Rassen. Zool. Jahrb.: Abt. Syst. Geogr. Biol. Thiere 3, 1888, 51–58.

Nobis 1981: G. Nobis, Aus Bonn: Das älteste Haustier des Menschen. Unterkiefer eines Hundes aus dem Magdaleniengrab von Bonn-Oberkassel. Das Rheinische Landesmuseum Bonn: Ber. Arb. Mus. 4/1981, 49–50.

Olsen 1985: S. J. Olsen, Origins of the Domestic Dog: the Fossil Record (Tucson 1985).

Olsen/Olsen 1977: S. J. Olsen / J. W. Olsen, The Chinese wolf, ancestor of New World dogs. Science 197(4303), 1977, 533–535.

O'Regan/Kitchener 2005: H. J. O'Regan / A. C. Kitchener, The effects of captivity on the morphology of captive, domesticated and feral mammals. Mammal Rev. 35, 2005, 215–230. DOI: 10.1111/j.1365-2907.2005.00070.x.

Ostrander/Wayne 2005: E. A. Ostrander / R. K. Wayne, The canine genome. Genome Research 15(12), 2005, 1706–1716.

Pang et al. 2009: J.-F. Pang / C. Kluetsch / X.-J. Zou / A. Zhang / L. Luo / H. Angleby / A. Ardalan / C. Ekström / A. Sköllermo / J. Lundeberg / S. Matsumura / T. Leitner / Y. Zhang / P. Savolainen, mtDNA data indicate a single origin for dogs south of Yangtze River, less than 16,300 years ago, from numerous wolves. Molecular Biol. Evolution 26(12), 2009, 2849–2864.

Pilot et a. 2012: M. Pilot / W. Jędrzejewski / V. E. Sidorovich / W. Meier-Augenstein / A. R. Hoelzel, Dietary differentiation and the evolution of population genetic structure in a highly mobile carnivore. PloS One 7(6), 2012. DOI: 10.1371/journal.pone.0039341.

2014: M. Pilot / M. Dąbrowski / V. Hayrapetyan / E. Yavruyan / N. Kopaliani / E. Tsingarska / B. Bujalska / S. Kamiński / W. Bogdanowicz, Genetic Variability of the Grey Wolf *Canis lupus* in the Caucasus in Comparison with Europe and the Middle East: Distinct or Intermediary Population? PLoS One 9(4), 2014. DOI: 10.1371/journal.pone.0093828.

Pionnier-Capitan 2010: M. Pionnier-Capitan, La domestication du chien en Eurasie: étude de la diversité passée, approches ostéoarchéologiques, morphométriques et paléogénétiques. [Diss. Univ. Lyon 2010].

Pionnier-Capitan et al. 2011: M. Pionnier-Capitan / C. Bemilli / P. Bodu / G. Célérier, New evidence for Upper Palaeolithic small domestic dogs in South-Western Europe. Journal Arch. Scien. 38, 2011, 2123–2140. DOI: 10.1016/j.jas.2011.02.028.

Pitulko/Kasparov 2017: V. V. Pitulko / A. K. Kasparov, Archaeological dogs from the Early Holocene Zhokhov site in the Eastern Siberian Arctic. Journal Arch. Scien.: Reports 13, 2017, 491–515.

Pluskowski 2006: A. Pluskowski, Where are the wolves? Investigating the scarcity of European grey wolf (*Canis lupus lupus*) remains in medieval archaeological contexts and its implications. Internat. Journal Osteoarch. 16(4), 2006, 279–295.

Rizk 2012: O. T. Rizk, Insight into the Genetic Basis of Craniofacial Morphological Variation in the Domestic Dog, *Canis familiaris*. [Diss. Univ. California, Berkley 2012]. https://escholarship.org/content/qt3hw582pm/qt3hw582pm_noSplash_dfb634e730a6e50c68839f31db326a1f.pdf.

Rütimeyer 1861: L. Rütimeyer, Die Fauna der Pfahlbauten der Schweiz. Geschichte der Wilden und der Haus-

Säugethiere. Neue Denkschr. Allgem. Schweiz. Ges. Naturwiss. 19 (Basel 1861).

1875: L. Rütimeyer, Die Knochenhöhle von Thayingen bei Schaffhausen (Braunschweig 1875).

Sablin/Khlopachev 2002: M. Khlopachev / G. Sahlin, The earliest ice age dogs: evidence from Eliseevichi 11. Current Anthr. 43(5), 2002, 795–799.

Savolainen et al. 2002: P. Savolainen / Y.-P. Zhang / J. Luo / J. Lundeberg / T. Leitner, Genetic evidence for an East Asian origin of domestic dogs. Science 298(5598), 2002, 1610–1613.

Schmitt/Wallace 2012: E. Schmidt / S. Wallace, Shape changes and variation in the cranial morphology of wild canids (*Canis lupus*, *Canis latrans*, *Canis rufus*) compared to domestic dogs (*Canis familiaris*) using geometric morphometrics. Internat. Journal Osteoarch. 24, 2012, 42–50.

Schweizer et al. 2017: A. V. Schweizer / R. Lebrun / L. A. B. Wilson / L. Costeur / T. Schmelzle / M. R. Sánchez-Villagra, Size Variation under Domestication: Conservatism in the inner ear shape of wolves, dogs and dingoes. Science Reports 7, 2017, 13330. DOI: 10.1038/s41598-017-13523-9.

Shannon et al. 2015: L. M. Shannon / R. H. Boyko / M. Castelhano / E. Corey / J. J. Hayward / C. McLean / M. E. White / M. Abi Said / B. A. Anita / N. Ikombe Bondjengo / J. Calero / A. Galov / M. Hedimbi / B. Imam / R. Khalap / D. Lally / A. Masta / K. C. Oliveira / L. Pérez / J. Randall / N. Minh Tam / F. J. Trujillo-Cornejo / C. Valeriano / N. B. Sutter / R. J. Todhunter / C. D. Bustamante / A. R. Boyko, Genetic structure in village dogs reveals a Central Asian domestication origin. Proc. Nat. Acad. Scien. 112(44), 2015, 13639–13644.

Sharma et al. 2004: D. K. Sharma / J. E. Maldonado / Y. V. Jhala / R. C. Fleischer, Ancient wolf lineages in India. Proc. Royal Soc., Ser. B: Biol. Scien. 271, 2004. DOI: 10.1098/rsbl.2003.0071.

Skoglund et al. 2011: P. Skoglund / A. Götherström / M. Jakobsson, Estimation of population divergence times from non-overlapping genomic sequences: examples from dogs and wolves. Molecular Biol. Evolution 28(4), 2011, 1505–1517.

2015: P. Skoglund / E. Ersmark / E. Palkopoulou / L. Dalén, Ancient wolf genome reveals an early divergence of domestic dog ancestors and admixture into high-latitude breeds. Current Biol. 25, 2015, 1515–1519.

Sotnikova/Rook 2010: M. Sotnikova / L. Rook, Dispersal of the Canini (Mammalia, Canidae: Caninae) across Eurasia during the Late Miocene to Early Pleistocene. Quartenary Internat. 212(2), 2010, 86–97. DOI: 10.1016/j.quaint.2009.06.008.

Spotte 2012: S. Spotte, Societies of Wolves and Free-ranging Dogs (New York 2012).

Stein/Weiss 2016: E. M. Stein / G. Weiss, Introduction to Fourier Analysis on Euclidean Spaces. Princeton Math. Ser. 32 (Princeton 2016).

Stockhaus 1965: K. Stockhaus, Metrische Untersuchungen an Schädeln von Wölfen und Hunden. Journal Zool. Systematics and Evolutionary Research 3(1–2), 1965, 157–258.

Street 1991: M. Street, Bedburg-Königshoven: A Pre-Boreal Mesolithic site in the Lower Rhineland (Germany). In: R. Barton / A. Roberts / D. Roe (eds), The Late Glacial in North-west Europe: Human Adaptation and Environmental Change at the End of the Pleistocene. CBA Research Reports 77 (London 1991) 256–270.

2002: M. Street, Ein Wiedersehen mit dem Hund von Bonn-Oberkassel. Bonner Zool. Beitr. 50, 2002, 269–290.

Street/Jöris 2015: M. Street / O. Jöris, The age of the Oberkassel burial in the context of climate, environment and the late glacial settlement history of the Rhineland. In: L. Giemsch / R. Schmitz (eds), The Late Glacial Burial from Oberkassel Revisited. Rhein. Ausgr. 72 (Darmstadt 2015) 25–42.

Stubbe 1981: M. Stubbe, The wolf, *Canis lupus* L. In: H. Stubbe (ed.), Buch der Hege 1. Haarwild (Berlin 1981) 269–285.

Studer 1901: T. Studer, Die prähistorischen Hunde in ihrer Beziehung zu den gegenwärtig lebenden Rassen (Zürich 1901).

Tchernov/Valla 1997: E. Tchernov / F. Valla, Two new dogs, and other Natufian dogs, from the southern Levant. Journal Arch. Scien. 24, 1997, 65–95. DOI: 10.1006/jasc.1995.0096 .

Terrenato/Ulizzi 1983: L. Terrenato / L. Ulizzi, Genotype-environment relationships: an analysis of stature distribution curves during the last century in Italy. Ann. Human Biol. 10(4), 1983, 335–346.

Thalmann/Perri 2018: O. Thalmann / A. Perri, Paleogenomic inferences of dog domestication. In: C. Lindqvist / O. Rajora (eds), Paleogenomics. Genome Scale Analysis of Ancient DNA (Cham 2018) 273–306.

Thalmann et al. 2013: O. Thalmann / B. Shapiro / P. Cui / V. Schuenemann / S. K. Sawyer / D. L. Greenfield / M. B. Germonpré / M. V. Sablin / F. López-Giráldez / X. Domingo-Roura / H. Napierala / H.-P. Uerpmann / D. M. Loponte / A. A. Acosta / L. Giemsch / R. W. Schmitz / B. Worthington / J. E. Buikstra / A. Druzhkova/ A. S. Graphodatsky / N. D. Ovodov / N. Wahlberg / A. H. Freedman / R. M. Schweizer / K.-P. Koepfli / J. A. Leonard / M. Meyer / J. Krause / S. Pääbo / R. E. Green / R. K. Wayne, Complete mitochondrial genomes of ancient canids suggest a European origin of domestic dogs. Science 342(6160), 2013, 871–874.

Thompson 1917: D. W. Thompson, On Growth and Form (Cambridge 1917).

Turnbull/Reed 1974: P. F. Turnbull / C. A. Reed, The fauna from the terminal Pleistocene of Palegawra Cave, a Zarzian occupation site in northeastern Iraq. Fieldiana Anthr. 63, 1997, 81–146. DOI: 10.5962/bhl.title.5170.

Vigne 2011: J. Vigne, The origins of animal domestication and husbandry: a major change in the history of humanity and the biosphere. Comptes Rendus Biol. 334, 2011, 171–181.

Vilà et al. 1997: C. Vilà / P. Savolainen / J. E. Maldonado / I. R. Amorim / J. E. Rice / R. L. Honeycutt / K. A. Crandall / J. Lundeberg / R. K. Wayne, Multiple and ancient origins of the domestic dog. Science 276(5319), 1997, 1687–1689.

VonHoldt et al. 2010: B. VonHoldt / J. P. Pollinger / K. E. Lohmueller / E. Han / H. G. Parker / P. Quignon / J. D. Degenhardt / A. R. Boyko / D. A. Earl / A. Auton / A. Reynolds / K. Bryc / A. Brisbin / J. C. Knowles / D. S. Mosher / T. C. Spady / A. Elkahloun / E. Geffen / M. Pilot / W. Jedrzejewski / C. Greco / E. Randi / D. Bannasch / A. Wilton / J. Shearman / M. Musiani / M. Cargill / P. G. Jones / Z. Qian / W. Huang / Z.-L. Ding / Y.-P. Zhang / C. D. Bustamante / E. A. Ostrander / J. Novembre / R. K. Wayne, Genome-wide SNP and haplotype analyses reveal a rich history underlying dog domestication. Nature 464(7290), 2010, 898–902.

2018: B. M. VonHoldt / S. S. Ji / M. L. Aardema / D. R. Stahler / M. A. R. Udell / J. S. Sinsheimer, Activity of Genes with Functions in Human Williams–Beuren Syndrome Is Impacted by Mobile Element Insertions in the Gray Wolf Genome. Genome Biol. and Evolution 10(6), 2018, 1546–1553.

Waller et al. 2013: B. M. Waller / K. Peirce / C. C. Caeiro / L. Scheider / A. M. Burrows / S. McCune / J. Kaminski, Paedomorphic facial expressions give dogs a selective advantage. PLoS One 8(12), 2013. DOI: 10.1371/journal.pone.0082686.

Wang et al. 2013: G. D. Wang / W. Zhai / H.-C. Yang / R.-X. Fan / X. Cao / L. Zhong / L. Wang / F. Liu / H. Wu / L.-G. Cheng / A. D. Poyarkov / N. A. Poyarkov Jr / S.-S. Tang / W.-M. Zhao / Y. Gao / X.-M. Lv / D. M. Irwin / P. Savolainen / Ch.-I. Wu / Y.-P. Zhang, The genomics of selection in dogs and the parallel evolution between dogs and humans. Nature Comm. 4, 2013. DOI: 10.1038/ncomms2814.

Wayne 1986: R. K. Wayne, Cranial morphology of domestic and wild canids: the influence of development on morphological change. Evolution 40, 1986, 243–261.

Wolfgram 1894: A. Wolfgram, Die Einwirkung der Gefangenschaft auf die Gestaltung des Wolfschädels. Zool. Jahrb.: Abt. System. Geogr. Biol. Tiere 7, 1894, 773–822.

Yeomans et al. 2019: L. Yeomans / L. Martin / T. Richter, Close companions: Early evidence for dogs in northeast Jordan and the potential impact of new hunting methods. Journal Anthr. Arch. 53, 2019, 161–173.

Zeder 2012: M. A. Zeder, The domestication of animals. Journal Anthr. Research 68, 2012, 161–190.

Zeuner 1963: F. Zeuner, The Dog (New York 1963).

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Bear Skins and Human Death – Tracing Soft Organic Materials in Iron Age and Medieval Burials in Fennoscandia

ABSTRACT

The paper takes a look on the role of bear skins in human death and burial for Iron Age and medieval Fennoscandia, by bringing together recent research. All in all, 24 »bear skin burials«, some abundantly rich in furnishings, can be identified in the research area. They belong to three different types. However, substantial skin is known from only one half of the burials in Sweden and Norway. As regards Finland, microscopic analysis has identified not only fur remains but also hairs. In many cases, the lack of fur finds can be explained not only by the poor preservation conditions but also by the lack of systematic research. It would be worthwhile to use present-day standards in microscopic fur and hair analysis to re-analyse archaeological finds from earlier days still existing in museum archives.

KEYWORDS

Fennoscandia / Iron Age / medieval times/ bear / bear fur / bear hair / microscopic analysis

Introduction

Bear skins or bear hairs in burials have been long known and were noted, for example, by the archaeologist H. Shetelig (1912) in his classic study of western Norwegian Iron Age burials. This book even included a photo of the skin (hair) that had been preserved in the Migration period burial in Døsen, Os, Hordaland, in western Norway (**fig. 1**). In former Finland, Th. Schwindt (1893) detected bear hairs together with several other remains of furred animals in the Kekomäki cemetery on the Karelian Isthmus in the 1890s. In this case, Schwindt interpreted bear hairs to indicate the placing of the corpse on a bear skin.

The cases presented in this article from Norway, Sweden and Finland are particularly interesting, as bear skins in burial contexts are extremely rare on the European mainland. Brown bear skin remains have only been reported in Iron Age contexts in

Fig. 1 Bear skin (hair) found in the Migration period male grave (mound IV) in Døsen, Os, Hordaland in western Norway. – (After Shetelig 1912, fig. 346).

a Hallstatt period tumulus in Altheim (Augstein 2023). Such skin remains have also been detected besides burial contexts, e. g. in Neolithic »Ötzi's« cap and shoes, and perhaps also made into a bag in the salt-mines of Dürrnberg (Hollemeyer et al. 2012; Rast-Eicher 2016, 172).

Most recently, for Fennoscandia, this topic has attracted interest in two different respects: firstly, in connection with a Ph.D. thesis which included a microscopic analysis of fur and hair remains in Finnish burials (Kirkinen 2015; 2019), and, secondly, by the gathering and critical analysis of all the available archaeological information on Iron Age burials with assumed or actual skin (hair) remains in Scandinavia (Grimm 2013; 2023). The latter studies, in fact, only relate to parts of Norway and Sweden, in which Migration period inhumation graves with skin remains dominate. These finds have also played a role in a scholarly discussion of whether burials, mostly cremations, with bear claws should be taken as evidence for the existence of skins on funeral pyres (among others: Beermann 2016). In addition, for some of the graves – men lavishly furnished with weapons and real skin (hair) remains – a connection was made with the so-called berserks, i. e. members of warrior-clans clad in bear skins, as known from Old Norse literature (e. g. Bender Jørgensen 2001; 2003).

In the present paper, the most recent research will be sketched for Finland and Scandinavia, which are understood as one research area here, and, on this basis, the potential for future research will be pinpointed when addressing remarkable discoveries that have been made over the past years in northern Norway.

The Key Find from the Högom Chamber Grave in Northern Sweden

In Högom, Medelpad, northern Sweden, excavations (1949 and onwards) of a large burial mound (no. 2) with a diameter of 40 m led to the discovery of a wooden grave chamber of 5 m × 2 m, whose roof had collapsed in antiquity (Nockert 1991; Ramqvist 1992; 2000). In 1951, the decision was taken to encase the entire chamber (weighing nine tons!) and bring it to The Central Board of Antiquities in Stockholm for indoor investigation. Here, in the same year, x-ray photographs were taken before the actual excavation was carried out by Dagmar Selling under laboratory conditions.

As it turned out, the burial was, amongst other things, outstanding in its textile and animal skin (hair) preservation, which is unique in northern European respects (Nockert 1991, 1. 31. 36. 106–107). As to the animal remains, very little skin but much hair is preserved, mostly from the area on, around and underneath the buried person. Early on, it was believed that the entire grave chamber was once covered by bear skins. The textile conservator Eva Lundwall, a member of the Board, carried out an investigation of fur (hair) samples from different parts of the chamber, and, according to her results, the possibility remains that bear skin was placed on the entire chamber floor. Bear hairs found on the belt and sword suggest that a skin was once placed over the deceased. Roe deer/reindeer fur hairs only originate from the dead person, around his belt and up to the throat, whereas beaver and marten hairs were also found above and around the head. The beaver hairs may originate from a cap, while the reindeer/roe deer and other fur hairs may come from garments. Furthermore, sable, polecat and pinniped/musquash hair remains have been found but there is no information about their exact positions in the burial.

This burial, unrobbed and with a dating to c. AD 500, is among the richest ones of northern Europe's Migration period, owing to exquisite finds, such as weapons (in particular the sword), a horse harness, glass beakers from the Black Sea area, bronze vessels, and so on (Ramqvist 1992, 31–153. 223; 2000). At the site, there were altogether four substantial burial mounds in one row. One of these yielded a special type of building, perhaps a hall, which was later covered by the mound. It can be taken as given that, in the period from 200/300 to the 6th century, a magnate's seat existed in Högom.

Number and Typology of »Bear Skin Burials« in Fennoscandia

All in all, 24 Iron Age and medieval burials in Fennoscandia have yielded (published) remains of bear skins, seven from Finland and 17 from Norway and Sweden (**fig. 2; tab. 1**). Three different types can be discerned, with types 1 and 2 relevant for Norway and Sweden and type 3 for Finland:

Fig. 2 Distribution of Iron Age and medieval »bear skin burials« in Fennoscandia (see **tab. 1** for sites). – (Map M. Bolte, LEIZA).

Type 1: skin or hair remains, often with claws still attached or claws found nearby,
a) substantial hair/fur remains,
b) small hair/fur remains;

Type 2: groups of claws in correct anatomical order in the burial, suggesting that there was once a bear skin;

Type 3: loose bear hairs (and sometimes skin), the identification of which is based on morphological analysis by microscope.

All relevant burials have seen recent (re-)analysis by the authors of this paper, the results of which will be shortly introduced in the following two sections.

No.	Site	Dating	Burial rite	Sex of the deceased	Status of the burial	Skin burial type	Selected literature
1	Føre, Bø, grave 1 (northern Norway)	c. 325-375/400	Inhumation	Male	Above average	1a	Sjøvold 1962, 77; Lund Hansen 1987, 442
2	Føre, Bø, grave 2 (northern Norway)	c. 160/180-260	Inhumation	Female	Above average	1a	Ilkjær 1990, cat. no. 182; Bemmann/Hahne 1994, cat. no. 410; Klokkervoll 2015, 66-67; Roth Niemi 2018, 48
3	Hillesøy, Kvaløy (northern Norway)	c. 800	Inhumation	Male	Above average	1a	Roth Niemi 2018
4	Haram, Haram (western Norway)	c. 325-375/400	Cremation	Male	Top status	1b	Solberg 1984, 100-101; 2000, 121; Lund Hansen 1987, 440
5	Evebø, Gloppen (western Norway)	Late 4th/5th century	Inhumation	Male	Top status	1b	Shetelig 1912, 111-117; Kristoffersen 2000, cat. no. 92
6	Nedre Aure, Voss (western Norway)	Unknown	Inhumation	Double grave; sex of individuals unknown	Unknown	?	Description of the find: B520-525 (Bergen Museum)
7	Døsen, Os (western Norway)	c. 425-475	Inhumation	Male	Meagre	1a	Shetelig 1912, 141-148
8	Krosshaug, Tu (south-western Norway)	c. 450	Inhumation	Female	Top status	1b	Magnus 1975, 19-20. 106; 2014, 74; Kristoffersen 2000, cat. no. 47
9	Sletten, Vanse (southern Norway)	Late 5th/early 6th century	Inhumation	Female (several individuals)	Above average	1b	Kristoffersen 2000, cat. no. 26
10	Snartemo, Hægebostad, grave V (southern Norway)	Late 5th or 6th century	Inhumation	Male	Top status	1b	Hougen 1935, 8-9; Kristoffersen 2000, cat. no. 19
11	Vemestad, Lyngdal (southern Norway)	Mid-5th century	Inhumation	Male and female	Above average	1b	Shetelig 1912, 158; Bemmann/Hahne 1994, cat. no. 201
12	Vestre Skogsfjord, Mandal (southern Norway)	Late 5th/6th century	Cremation	Male	Above average	1b	Gjessing 1925, 44; Holck 1986, 277; Hauken 2005, cat. no. 21
13	Eik, Søgne (southern Norway)	c. 325-375/400	Cremation	Male; second individual undetermined	Above average	1b	Gjessing 1925, 44; Holck 1986, 277; Lund Hansen 1987, 436; Hauken 2005, cat. no. 25
14	Smiss, Eke (Gotland, Sweden)	c. 160/180-325	Inhumation	Female	Above average	2	Almgren/Nerman 1923, 89 fig. 156a, Petré 1980, 6; Lund Hansen 1987, 446

No.	Site	Dating	Burial rite	Sex of the deceased	Status of the burial	Skin burial type	Selected literature
15	Hallvede, Eke (Gotland, Sweden)	c. 550/575-750/800	Inhumation	Male	Above average	2	Description of the find: SHM 25133 (Statens Historiska Museer); Petré 1980, 6 fig. 2
16	Högom, Selånger, mound 2 (northern Sweden)	c. 500	Inhumation	Male	Top status	1a	Ramqvist 1992, 31-153. 223; 2000
17	Högom, Selånger, mound 4 (northern Sweden)	c. 375/400-550/575	Cremation	Unknown	Above average	1a	Ramqvist 1992, 194-198
18	Kekomäki, Kaukola, grave 1 (Karelian Isthmus, formerly Finland; now Russia)	c. 13th/14th century	Inhumation	Male and female	Top status	3	Schwindt 1893, 16-32. 144-145. 182; Kirkinen 2015
19	Luistari, Eura, grave 95 (south-western Finland)	9th century	Inhumation	Female	Above average	3	Lehtosalo-Hilander 1982a; 1982b; Kirkinen 2015
20	Luistari, Eura, grave 377 (south-western Finland)	11th century	Inhumation	Female	Above average	3	Lehtosalo-Hilander 1982a; 1982b; Kirkinen 2015
21	Luistari, Eura, grave 56 (south-western Finland)	11th century	Inhumation	Female	Top status	3	Kirkinen et al. 2020b
22	Ristimäki, Ravattula, grave 4/2014 (south-western Finland)	12th/13th century	Inhumation	Female	Above average	3	Kirkinen et al. 2020a
23	Ristimäki, Ravattula, grave 18/2016 (south-western Finland)	12th/13th century	Inhumation	Female	Above average	3	Kirkinen et al. 2020a
24	Mukkala, Savukoski, grave III (northern Finland)	17th century	Inhumation	Male	No estimation possible	3	Kirkinen et al. 2019

Tab. 1 Iron Age and medieval »bear skin burials« from Fennoscandia.

Recent Research: Analysis of All Available Archaeological Information on Iron Age »Bear Skin Burials« in Norway and Sweden

Present analysis has placed an emphasis on the evidence of actual bear skins for assuming »bear skin burials« (see Grimm 2013; 2023). In contrast, the hundreds of Iron Age burials with bear claws known from Norway, Sweden, Finland and Denmark do not qualify as »bear skin burials« (contrary to Beermann 2016, amongst others, who equates bear claws in graves with bear skin burials). It might well be

that bear skins were also part of the burial custom in these instances, but this cannot be proven, in contrast to cases with actual remains of skins in mortuary contexts.

The bulk of »bear skin burials« came to light in the early days of archaeology in the 19th and early 20th century under excavation conditions that were rather rough when compared with present-day standards (Grimm 2013; 2023). Remarkably, however, two more such finds have been discovered in recent years in northern Norway (see further below), which increases the number of such instances to currently 17 for Iron Age Norway and Sweden, whereas no such finds have come to light in Denmark. The material is thus limited, unrepresentative and statistically irrelevant (see **tab. 1**). Each new find may change the entire picture (see further below on northern Norway).

As already stated, two different types of »bear skin burials« are relevant for Norway and Sweden. Firstly, there is type 1 in the form of skin remains, often with claws attached. In this respect, however, the difference between the substantial number of skin- or hair-leftovers (type 1a) in six burials and the small ones (type 1b) in eight cases must be noted. Secondly, type 2 with groups of bear claws in correct anatomical order suggests a decayed skin (three burials). It warrants a mention that grave 2 in Føre represents type 1a as well as type 2, and that for a burial in Aure (western Norway) all we have is a mention of a bear skin.

Critically regarded, »bear skin burials« can be suggested for only about one half of the cases (types 1a and 2). In the other ones, the information from the old excavations is simply too sparse and the skin remains too small. They may well originate from claws with attached skin/hair remains.

To frame these finds properly: thirteen originate from inhumation and four more from cremation burials, and they mostly date to the Late Roman and Migration periods, c. 200–550/575 (14 out of 17; Grimm 2013; 2023). It is worth mentioning, too, that the earliest of these burials (Smiss on Gotland; 160/180–325) is that of a woman (see Jordahl et al. 2023 for Gotland and Ljungkvist/Lindholm 2023 for Sweden on the whole). Equally remarkable is a new find from Hillesøy in northern Norway (see below), which pushes the chronological frame up to the Late Vendel/Early Viking Age (around 800). Socially regarded, burials with bear skins are mostly furnished above average (Grimm 2013; 2023). Even more, in a number of cases (five out of seventeen), they represent the richest graves of their time, and this applies in particular to Migration period weapon graves in Norway (Evebø in the western and Snartemo [grave 5] in the southern part of the country) and Sweden (Högom [mound 2] in the north of the country). However, the burial of the Migration period petty queen from Krosshaug, Tu, south-western Norwegian Rogaland, may also belong to that group of graves.

Recent Research: Microscopic Analysis of Bear Skin Remains in Finland and on the Karelian Isthmus

In Finland, loose bear hairs, interpreted as bear skin remains, have been detected in the Luistari and Ristimäki cemeteries, south-western Finland, the Kekomäki cemetery on the Karelian Isthmus (former Finland) and in Mukkala in northern Finland (Kirkinen 2015; 2017; 2019; Kirkinen et al. 2020a; 2020b). These burials have been classified as type 3 ones for the present article. In contrast to types 1 and 2, no third phalanges of bear have been detected there. This can be interpreted either as the removal of claws from pelts for other purposes or the decaying of bones in the acidic soils of Finland.

The Kekomäki cemetery was excavated by Theodor Schwindt (1893) in the 1890s. Grave 1, a richly furnished chamber-like burial of two females and two males, dated to the first half of the 13th century (Uino 1997, 233), is of particular interest. The grave was covered with birch bark painted with red ochre and furnished with wild animal skins. The distribution of bear and reindeer hairs indicates that the deceased were laid to rest on the pelts of these specimens. In addition, hairs and skin fragments of garments made of furred animal/mustelids, cervids, seal (Phocidae), and possibly red fox (*Vulpes vulpes*) skins have been identified (Kirkinen 2015; 2019; see Schwindt 1893, 16–32. 144–145. 182).

In 2019, a large-scale survey on the fur and hair remains in Late Iron Age (800–1200) and medieval (1200–1500) inhumation graves revealed that bear hairs were also present in the Luistari inhumation cemetery, south-western Finland. In the female burials 95 and 377, dated to the 9th and 11th centuries, those bear hairs which were found under the bracelet and necklace and under the apron hem, all had direct contact with the spiral ornaments. This has led to their preservation since toxic metal alloys have prevented the activity of bacteria and fungi (Lehtosalo-Hilander 1982a, 112. 262; 1982b, 184. 188;

Kirkinen 2015). Most interestingly, in the 11th-century female grave 56, minuscule bear hair fragments that were in direct contact with pendants, oval tortoise brooches and a chain, were detected during microscopic analysis. By studying the distribution of the fragments on the upper body of the deceased, the hairs were interpreted tentatively as the remains of a traditional *sieppuri*, a short cape made of bear or wolverine pelt, which is known to have been used by the Sámi (Sirelius 1912, 50–51; Itkonen 1948, 339; Kirkinen et al. 2020b). Another possible explanation is that her upper body was covered with a bear pelt while a (wild forest) reindeer pelt was placed on her lower body. Also, hairs and skin fragments of a pouch made of otter (*Lutra lutra*) skin, hairs possibly from a mustelid collar, and a sheath lined with lynx (*Lynx lynx*) fur were recovered (Kirkinen et al. 2020b). Here, the richness in metal items as well as wild animal pelts can be interpreted as indicators of wealth and high social rank.

In the Ravattula Ristimäki cemetery, about 80 km south of Luistari, bear skin remains were detected in two female graves. In grave 4/2014, bear hairs were recovered from the top of a wide, bronze-plated knife sheath found under the deceased's head, and from the bottom of the coffin. In grave 18/2016, brown bear hairs were identified near the deceased's waist and from a soil sample taken from her stomach area. Additionally, bear hairs and skin fragments were recovered from a soil sample collected from the grave. In these burials, the corpses were evidently wrapped in a bear pelt (Kirkinen et al. 2020a). Most interestingly, Ristimäki cemetery is located around the earliest (12th–13th centuries) known church foundations in Finland, and the burials can be described as Christian in character (Ruohonen 2017). It can be supposed that the use of bear skins in burials was not favoured by the Church; instead, the clergy later aimed to stop the tradition by collecting the pelts from parishioners and by using them in front of the altar as carpets (Korhonen 1982a; 1982b; see also Østergård 2009, 120–121).

Bear skin remains have also been found in northern Finland, in the Mukkala forest Sámi cemetery in Savukoski in eastern Lapland. In grave III, the burial of a man, dated to the 17th century, big clumps of bear hair were detected (**fig. 3**; compare Kirkinen et al. 2019). Unfortunately, the site was excavated almost one hundred years ago, and the documenting of the skin remains cannot be regarded as adequate. Also in this case, the cemetery falls into the Christianization period of eastern Lapland, evidenced by historical sources as well as the burial crosses and Christian motifs found at the site (Leppäaho 1937).

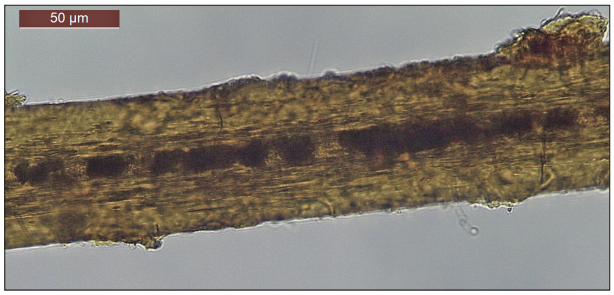

Fig. 3 A microscopic image of bear hair from a 17th-century male grave in Mukkala cemetery, northern Finland. – (Photo T. Kirkinen).

Potential of Future Research: Northern Norway as an Example

For a long time, only one burial with an assumed bear skin was known from northern Norway: grave 2 from Føre, Bø (Nordland), the burial of a woman, which dates back to the period of c. 325–375/400. This assumption is based on seven bear claws that were detected in the four corners of the cist (Sjøvold 1962, 77). Furthermore, an organic layer was found beneath the interred person, which is considered to be the remnants of the fur. However, in the past years, new knowledge about bear skins in burials has been obtained for that part of Norway.

When it comes to grave 1 at Føre, the burial of a man with weapons, one has to return to the original excavation report from the 1950s; it is only now that information from that report has been made available. As was the case in grave 2, an organic layer was observed beneath the interred person in grave 1, this time accompanied by one group of four claws in one of the corners of the burial (Klokkervoll 2015, 66–67; Roth Niemi 2018, 48). The find can be dated to the late second or the first part of the 3rd century AD (Ilkjær 1990, cat. no. 182; Bemmann/Hahne 1994, cat. no. 410).

Another instance of old documentation concerning skin remains is provided by the well-known weapon grave in mound I at Bø, Steigen (Nordland), found together with a female burial and excavated in the early 1950s (Slomann 1959). Both burials have the same dating as the aforementioned grave 1 at Føre (Slomann 1959, 3–4; cf. Ilkjær 1990, cat. no. 78; Bemmann/Hahne 1994, cat. no. 409). The find context of the weapon burial needs further clarification: in the original publication, the remains of skin are mentioned (Slomann 1959, 3–4), and the find cata-

logue from Tromsø Museum (Ts 5401 I) lists the remains of animal hair, whereas in recent publications reference is made to »remains of fur with thick hairs, presumably from bear« (Bakke 2012, 46; cf. Roth Niemi 2018, 48–49). Thus, there are two questions: what is really stated in the original excavation report about skin and hair, and what would be the results of a modern scientific analysis of these organic materials – if they still exist? In the present situation, since bear claws are absent, the burial at Bø can only tentatively be considered as a »bear skin burial«.

In addition to these old cases, a quite remarkable find came to light during a rescue excavation in 2017 at Hillesøy, located southwest of Kvaløya, just outside Tromsø (Troms; cf. Roth Niemi 2018). Nearly half of the burial had already been destroyed before the archaeologists got the word. What remains is a weapon burial placed in a 5-m-long boat that belongs to the transition from the Vendel to the Viking age, based on the chronology of the artefacts and the radiocarbon datings. One group of five claws was found in the intact part of the grave; five more were discovered, but they were no longer *in situ*. Beneath the deceased there was a dark layer, interpreted as the remnants of a bear skin (see above on Føre).

The mentioned burials at Føre and Hillesøy (and also the one at Bø) are quite similar as they are »above average« in their furnishings and belong to small groups of mounds that may reflect different generations of local farm populations (see mentioned literature). The new finds change the situation for Norway: grave 1 in Føre is the earliest in Norway with an assumed bear skin, whereas the interment at Hillesøy is the latest confirmed burial with a bear skin known in Norway and Sweden (however, one find in western Norway – Nedre Aure, Voss [Vestland] – defies a dating).

Thus, northern Norway points to the potential for further research; old excavation documents may add detail to graves and, in fact, turn them into »bear skin burials«. Re-analysed remains, kept in archives, may lead to a similar result. At the same time, the excavation at Hillesøy shows that new finds may still come to light and potentially improve our understanding of those which were unearthed much earlier.

Conclusion

Bear skin remains are most evidently underrepresented in archaeology because the preservation of soft organic materials depends on favourable conditions. In Late Iron Age and medieval inhumation burials in Finland, fur fragments have been preserved due to direct contact with silver and copper-alloy grave goods, where toxic metal alloys have prevented the activity of bacteria and fungi. Recently, even microscopic hair fragments have been detected on the surfaces of artefacts and in soil samples. In many cases, the lack of fur finds can be explained not only by the poor preservation conditions but also by the lack of systematic research. It would be worthwhile to use present-day standards in microscopic fur and hair analysis to re-analyse finds from earlier excavations.

Bibliography

Almgren/Nerman 1923: O. Almgren / B. Nerman, Die ältere Eisenzeit Gotlands 2 (Stockholm 1923).

Augstein 2023: M. Augstein, The role of bears in the Late Bronze and Early Iron Ages in southern Germany, with a focus on the Hallstatt period. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 1065–1090.

Bakke 2012: S. Bakke, Etnisitet i jernaldergraver på Engeløya i Steigen [M.A. thesis, Univ. Tromsø 2012].

Beermann 2016: S. Beermann, Bärenkrallen und Bärenfelle in Brand- und Körpergräbern der vorrömischen Eisenzeit bis Völkerwanderungszeit in Mittel- und Nordeuropa. Univforsch. Prähist. Arch. 279 (Bonn 2016).

Bemmann/Hahne 1994: J. Bemman / G. Hahne, Waffenführende Grabinventare der jüngeren römischen Kaiserzeit und Völkerwanderungszeit in Skandinavien. Studie zur zeitlichen Ordnung anhand der norwegischen Funde. Ber. RGK 75, 1994, 283–640.

Bender Jørgensen 2001: L. Bender Jørgensen, Bjornekrigere. Spor – nytt fra fortiden 2001(1), 4–8.

2003: L. Bender Jørgensen, Krigerdragten i folkevandringstiden. In: P. Rolfsen / F.-A. Stylegar (eds), Snartemofunnene i nytt lys. Univ. Kulturhist. Mus. Skr. 2 (Oslo 2003) 53–80.

Gjessing 1925: H. Gjessing, Vestagder i forhistorisk tid. In: H. Aall / A. W. Brøgger (eds), Norske bygder II. Vest-Agder I (Bergen 1925) 33–76.

Grimm 2013: O. Grimm, Bear-skins in northern European burials and some remarks on other bear-related furnishings in the north and middle of Europe in the first millenium AD. In: O. Grimm / U. Schmölcke (eds), Hunting in Northern Europe until 1500 AD – Old Traditions and Regional Developments, Continental Sources and Continental Influences. Papers presented at a workshop organised by the Centre for Baltic and Scandinavian Archaeology, Schleswig, June 16th and 17th, 2011. Schr. Arch. Landesmus., Ergr. 7 (Neumünster 2013) 277–296.

2023: O. Grimm, Bear skin burials revisited: Norway and Sweden, mainly migration period. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 533–546.

Hauken 2005: Å. D. Hauken, The Westland cauldrons in Norway. Ark. Mus. Stavanger Skr. 19 (Stavanger 2005).

Holck 1986: P. Holck, Cremated bones. A medical-anthropological study of an archaeological material on cremation burials. Antropol. Skr. 1 (Oslo 1986).

Hollemeyer et al. 2012: K. Hollemeyer / W. Altmeyer / E. Heinzle / Ch. Pitra, Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry combined with multidimensional scaling, binary hierarchical cluster tree and selected diagnostic masses improves species identification of Neolithic keratin sequences from furs of the Tyrolean Iceman Oetzi. Rapid Communication. Mass Spectrometry 26, 2012, 1735–1745.

Hougen 1935: B. Haugen, Snartemofunnene. Studier i folksvandringstidens ornamentikk og tekstilhistorie. Norske Oldfunn VII (Oslo 1935).

Ilkjær 1990: J. Ilkjær, Illerup Ådal. Die Lanzen und Speere. Jysk Ark. Selsk. Skr. 25.1–2 (Århus 1990).

Itkonen 1948: T. I. Itkonen, Suomen lappalaiset vuoteen 1945.1 (Porvoo 1948).

Jordahl et al. 2023: J. Jordahl / J. Ljungkvist / S. Sten, Bear claws in Iron Age burials on Gotland, Sweden – a first survey. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 453–468.

Kirkinen 2015: T. Kirkinen, The Role of Wild Animals in Death Rituals: Furs and Animal Skins in the Late Iron Age Inhumation Burials in Southeastern Fennoscandia). Fennoscandia Arch. XXXII, 2015, 101–120.

2017: »Burning pelts« – brown bear skins in the Iron Age and Early Medieval (1–1300 AD) burials in south-eastern Fennoscandia. Estonian Journal Arch. 21(1), 2017, 3–29.

2019: Between skins. Animal skins in the Iron Age and historical burials in eastern Fennoscandia [PhD thesis, Univ. Helsinki 2019].

Kirkinen et al. 2019: T. Kirkinen / A. Arponen / I. Vanden Berghe, Globalization and tradition in Forest Sámi commemoration rituals. Textiles and animal skins in the 17th century burial ground in Mukkala, Eastern Lapland, Finland. MASF 7, 2019, 177–195.

2020a: T. Kirkinen / J. Riikonen / C. J. Dove / J. Ruohonen, The identification and use of fur and feathers excavated from the Late Iron Age and early medieval (12th–13th centuries) Ravattula Ristimäki cemetery in Kaarina, Southwest Finland. Fennoscandia Arch. XXXVII, 2020, 45–59.

2020b: T. Kirkinen / K. Vajanto / S. Björklund, Animal-hair evidence in an 11th century female grave in Luistari, Finland. Arch. Textiles Rev. 62, 2020, 109–125.

Klokkervoll 2015: A. Klokkervoll, Dyrenes role i germansk gravskikk. En komparativ analyse av dyrenedleggelsene i nordnorske jernaldergraver [M.A. thesis, UiT/Norges arktiske universitet Tromsø 2015].

Korhonen 1982a: T. Korhonen, Saaliseläimen talja kirkkouhrina. Suomen Mus. 89, 1982, 45–68.

1982b: T. Korhonen, Saaliseläimen taljan ja kotieläimen vuodan käyttö uhreina. Suomen Antr. 3, 1982, 96–121.

Kristoffersen 2000: S. Kristoffersen, Sverd og spenne. Dyreornamentikk og sosial kontekst. Stud. Hum. Bergensia 13 (Bergen 2000).

Lehtosalo-Hilander 1982a: P.-L. Lehtosalo-Hilander, Luistari I. The Graves. Suomen Muinaismuistoyhdistyksen Aikakauskirja 82, 1 (Helsinki 1982).

1982b: P.-L. Lehtosalo-Hilander, Luistari II. The Artefacts. Suomen Muinaismuistoyhdistyksen Aikakauskirja 82, 2 (Helsinki 1982).

Leppääho 1937: J. Leppääho, Savukosken Mukkalan lappalaiskalmisto. Kotiseutu 3/4, 1937, 134–144.

Ljungkvist/Lindholm 2013: J. Ljungkvist / K.-J. Lindholm, Bears and the Viking Age transition in Sweden. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 387–404.

Lund Hansen 1987: U. Lund Hansen, Römischer Import im Norden. Warenaustausch zwischen dem Römischen Reich und dem freien Germanien während der Kaiser-

zeit unter besonderer Berücksichtigung Nordeuropas. Nordiske Fortidsm. Ser. B 10 (Copenhagen 1987).

Magnus 1975: B. Magnus, Krosshaugfunnet. Et forsok pa kronologisk og stilhistorisk plassering i 5. arh. Stavanger Mus. Skr. 9 (Stavanger 1975).

2014: Kvinnene fa Krosshaug I Klepp og Hol på Inderøy. In: E. S. Kristoffersen (ed.), Et akropolis på Jæren? Tinghaugplatået gjennom jernalderen. Ark. Mus. Stavanger, Varia 55 (Stavanger 2014) 71–87.

Nockert 1991: M. Nockert, The Högom find and other Migration period textiles and costumes in Scandinavia. Arch. and Environment 9 = Högom II (Uddevalla 1991).

Petré 1980: B. Petré, Bjornfallen i begravningsritualen – statusobjekt speglande regional skinnhandel? Fornvännen 75, 1980, 5–14.

Ramqvist 1992: P. H. Ramqvist, Högom. The excavations 1949–1984. Archaeology and environment of Högom I (Neumünster 1992).

2000: P. H. Ramqvist, Högom. In: RGA 15 (Berlin, New York 2000) 34–37.

Rast-Eicher 2016: A. Rast-Eicher, Fibres. Microscopy of archaeological textiles and furs (Budapest 2016).

Roth Niemi 2018: A. Roth Niemi, Nordvegen på Hillesøy. Utgravning av båtgrav fra yngre jernalder. Tromura / Tromsø Mus. Rapportser. 48 (Tromsø 2018).

Ruohonen 2017: J. Ruohonen, Ristimäki in Ravattula: on the remains of the oldest known church in Finland. In: J. Harjula / S. Hukantaival / V. Immonen / A. Randla / T. Ratilainen (eds), New Visits to Old Churches: Sacred Monuments and Practices in the Baltic Sea Region (Cambridge 2017) 46–60.

Schwindt 1893: Th. Schwindt, Tietoja Karjalan rautakaudesta ja sitä seuraavilta ajoilta Käkisalmen kihlakunnan alalta saatujen löytöjen mukaan. Suomen Muinaismuistoyhdistyksen Aikakauskirja 13 (Helsinki 1893).

Shetelig 1912: H. Shetelig, Vestlandske graver fra jernalderen (Bergen 1912).

Sirelius 1912: U. T. Sirelius, Über einige Traggeräte und Umschlagetücher bei den finnisch-ugrischen Völkern. Suomen Muinaismuistoyhdistyksen Aikakauskirja 26, 1912, 29–58.

Sjøvold 1962: Th. Sjøvold, The Iron Age Settlement of Arctic Norway. A study in the expansion of European Iron Age Culture within the Artic Circle I. Early Iron Age (Roman and Migration periods) (Tromsø 1962).

Slomann 1959: W. Slomann, Et nytt romertids gravfunn fra Nord-Norge. Viking 23, 1959, 1–28.

Solberg 1984: B. Solberg, Haramfunnet. In: S. Indrelid / S. Ugelvik Larsen, Fra de forste fotefar: Sunnmores forhistorie (Alesund 1984) 100–101.

2000: B. Solberg, Jernalderen i Norge. 500 før Kristus til 1030 etter Kristus (Oslo 2000).

Uino 1997: P. Uino, Ancient Karelia – Archaeological studies. Muinais-Karjala – Arkeologisia tutkimuksia. Suomen Muinaismuistoyhdistyksen Aikakauskirja 104 (Helsinki 1997).

Østergård 2009: E. Østergård, Woven into the Earth. Textiles from Norse Greenland (Aarhus 2000).

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And Say the Animal Responded?

Tracing Non-human Animal Agency in the Neolithic of Great Britain (4100–2300 BC)

ABSTRACT

That explorations of human-animal relations have been dominated by examples focusing on wild species and the initial steps towards domestication has been noted by Honeychurch/Makarewicz (2016, 351; although see Reid's 2020 paper »Putting the Life Back into Livestock in Archaeology« for examples ranging from the 18th century to the present, including some gloriously agentive cattle). This paper seeks to go some small way to redress this balance. Building on the pioneering Social Zooarchaeology of Hamilakis/Overton (2013a; 2013b), Mannermaa (2013), and Russell (2012) it proposes an expressly Posthumanist approach, supported by examples drawn from the Neolithic of the British Isles, 4100-2300 BC - a fascinating period that saw the introduction of already fully domesticated animal species that would make demands of their human cohabitants.

KEYWORDS

Posthuman / multi-species / Neolithic / cattle / agency

But as for Us, Who Are We (Following)?

Derrida's late animal work, a radical, proto-post-humanist examination of the nature of relations between the human and non-human animal species and the existential implications these have (Derrida 2008), underscores this paper and indeed my research practice more broadly. He poses the question »But as for me, who am I following?« (Derrida 2008, 52). Derrida's thought experiment puts animals – and a real little cat in particular – first. We should follow him.

As the study of the human past, archaeology is an inherently anthropocentric endeavour. The questions we ask of the archaeological evidence are focused on what it can tell us about past human worlds. This is especially true of zooarchaeology, which has traditionally primarily concerned itself with tracing evidence for animal exploitation, with emphasis placed upon the dead animal body – the ways in which death was brought about, its treatment post-mortem, and the uses to which it was put: »A key goal in animal bones studies is to understand how humans exploited animal carcasses, including the use of primary and derived products (e. g. skin, fur, meat, marrow, grease, sinews, glue, bone, horn and antler)« (Maltby 2014, 36).

Such animal bodies are units of value: calorific, social, capital. Animals as living entities thus find themselves framed in terms of their »secondary products«, as indicators of human economic models and, occasionally, as the foci of care (or lack thereof) (Hamilakis/Overton 2013a). Overwhelmingly, these animals are conceptualised as human prey, or in domestic contexts, as »livestock« – the latter in particular branded as inert, partible products lacking agency, and certainly lacking personhood (Russell 2012; Banfield 2018).

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As historical product of the modern, industrial era in which the archaeological discipline and zooarchaeological sub-discipline emerged, non-human animals are othered, positioned at the bottom of an hierarchical framework that places white, Western, educated and moneyed Man (and the use of gendered language is here entirely intentional) at the apex, with all others, to include people of colour, women, the poor, and animals subordinated. Following the philosophical position articulated by Descartes (see Veitch 1901), such a world is cleaved into paired opposites: man/woman, human/animal, culture/nature, wild/domestic, etc. that ascribe value-laden attributes to each side, weighted in favour of the male, human, cultural. The wild/domestic dichotomy is an interesting outlier here, more complex and with shifting value weighting – the wild is often allied with the domain of the male as dangerous, difficult and challenging, and in need of the influence of Man to bring about domestication and order (see Boyd 2017 for a discussion of Hodder/Meskell 2011). As opposite, the domestic is thus the product of Man's influence – the realm of the female and animals brought under the control of Man – and in becoming controlled/ordered is framed as something weak and lacking autonomy, independence, and critically, respect. These historically-situated attitudes are deeply entrenched in modern Western thought and thereby, in the structure of modern Western academic practice, and, if unacknowledged, shape the ways in which we can approach our understandings of past worlds, from the questions we ask of the evidence, to the very act of gathering data in the first place: data are *never* objective, independent, and absolute values detached from us, but at every stage of their emergence and translation are shaped by our underlying experiences/assumptions, beliefs and approaches to their identification and collection, and are disciplined by the technologies deployed in their creation (Barad 2007; Hacigüzeller 2012; Banfield 2018). In other words, such an approach will result in findings that simply reinforce underlying, untheorised assumptions, resulting in the production of Cartesian-infused pasts that may miss important evidence for ontological difference. For example, whilst the development of standardized zooarchaeological methodologies has undoubtedly improved the quality of zooarchaeological work and enables the meaningful comparison of datasets, the very act of standardization has also entrenched limitations: if we adhere strictly to the standard methodologies, we will find ourselves limited by them; if we seek evidence of exploitation as standard, we surely find it.

As a response, recently emergent Social Zooarchaeological approaches that augment and extend traditional zooarchaeological practices argue that it is possible to trace a broad spectrum of agentive animal behaviour through the osteological evidence, when utilised in conjunction with contextual information, and, for example, environmental and ethnographic data (Russell 2012; Sykes 2014), although too often, a nagging anthropocentrism lurks, limiting animals to a role as mere tools for accessing the human. However, Hamilakis/Overton (2013a; 2013b) offer a way forward: characterised by multi-species interactions of multi-directional agency and responsiveness, they demonstrate the value of exploring more-than-human pasts in their reconsideration of human and swan osseous material from the Mesolithic sites of Aggersund and Vedbæk-Bøgebakken, Denmark (Hamilakis/Overton 2013a). By building on the traditional zooarchaeological analyses that informed the sites' original interpretations through incorporation of approaches originating in animal behavioural studies, ecology and animal geography, rich multi-species interactions situated within, and inseparable from, their particular environmental contexts are teased out to reveal the nature of human-swan interactions that span scales from the individual to species levels. Through a focus on seasonal movements, rhythms, and known behaviours of humans and swans, and the potential for interaction therein afforded, the depositional associations between swan bones and other species and material types represented enable intimate narratives of human-swan communion, of human encounter with agentive swan individuals. Critically, the evidence drawn upon extends far beyond faunal assemblages to incorporate analyses of multiple material types that are traditionally separated as a consequence of academic specialisms; also crucial are contextual assemblages and documentary archival material. Hamilakis and Overton thus demonstrate that is it possible to push Social Zooarchaeology to its limits and decentre the human: the human-animal relationship *itself* is the focus of enquiry – not the human – and it is for this reason that their approach is foundational for the Posthuman archaeology here advocated.

Posthuman Archaeology

Like Hamilakis and Overton's Social Zooarchaeology, the Posthumanist approach entails a rejection of human exceptionalism, both explicit and implicit, which is bound up with the broader problematisation of dualistic thinking discussed above. However, it is important also to recognise where dualistic terms are necessary to communicate ideas effectively. Wild/domesticated is, for example, a reductive, over-simplification of relationships that are scalar (ranging from those that make no distinction between wild and domestic spheres at one end of the scale, to those that make explicit use of the concepts as a structural devices at the other) rather than oppositional, but each term also acts as useful shorthand for communicating ideas of acknowledged complexity within the context of a dominant ontology grounded in oppositional structures. Likewise, human/animal is the oppositional pairing that drives such Posthumanist responses as the present study, yet both terms are requisite for communicating effective critique of the status quo. All terms are therefore employed whilst fully acknowledging their shortcomings and inherent loadedness.

Decentering the human entails beginning enquiry from a point of ontological flatness; seeking to exclude hierarchies of dominance prior to engagement with the evidence through rigorous critique of the research process. Indeed, in order to produce authentic, theoretically sustainable Posthumanist pasts, it becomes critical to fully embrace and inhabit Posthumanist ontology in all aspects of research – a Posthumanist present. This withinness, or situatedness within the approach demands commitment at all levels of engagement, from the questions posed, to data collection, to analyses deployed and the conclusions drawn – all are inherently interpretative and theoretically laden.

In practice, this entails starting from a point at which all units of evidence (artefacts, ecofacts, etc.) are accorded equal weighting so that as different assemblages (zooarchaeological, contextual, spatial, etc.) are explored, difference, meaning and hierarchies – should they present themselves – have space to emerge. The human does not thus automatically assume a position of hierarchical primacy from the outset – although such a position may ultimately be revealed by the evidence[1]. A Posthumanist approach demands dismantling established material categories, for example, collapsing/integrating specialist distinctions and practices that separate human bone, animal bone and worked bone. Indeed, building on Hamilakis/Overton's (2013a, 114) critique of speciesism that lumps all non-humans into an unproblematised, untheorised catch-all category of »animal«, redefining osteological assemblages such that all species, human and non-human, are analysed using a fully integrated approach has been shown to be a productive point of analytical departure, particularly when working with prehistoric, comingled remains (Banfield 2018).

Assemblage and multiplicity (Deleuze/Guattari 2004; DeLanda 2006) are core premises within Posthumanist discourse, and indeed, are critical components and outputs of Posthumanist archaeology with its focus on the intersection of different archaeological assemblages. Assemblage Theory understands assemblages to be gatherings of matter, both material and immaterial, identifiable as individuated phenomena, and yet variable in their constitution. The boundaries of assemblages are pervious such that components may join and/or leave the assemblage, or may form parts of multiple different assemblages simultaneously, without necessarily impacting an assemblage's identity (DeLanda 2006, 10; Fowler/Harris 2015). Assemblages are affective and may form more than the sum of their parts, as demonstrated by Bennett (2010, 25) in her mesmerising narrative of the multiple causalities and impacts of an outage on the North American electrical grid. Assemblages form, grow, shrink, disperse, and encounter – and affect – other assemblages. It follows that this affective quality reveals a relationally contingent nature. Assemblage Theory finds that all entities are relationally-constituted assemblages of transient stability and thereby rejects definitive essences and/or essential qualities in phenomena. This means that all persons are themselves assemblages of changing relations that maintain an individual identity as such until such a point as the assemblage disperses (which may transcend corporeal death): the animal body is a swarming mass of carbon, water, skin, sweat, bodies ingested, viruses, thoughts,

1 The hierarchical dominance of the Cartesian »Man« is a reality in Cartesian ontological terms, and this is one among a number of realities that posthumanism recognises on the basis of the evidence. Posthumanism is therefore not against humanism; rather, it stands in relation with humanism. It is responsive and as a response, it follows the humanist position, but it is not fixed in a temporal relation in the sense that the stances it describes may precede the humanist.

responses, behaviours, etc. all of which are subject to change/modification/replacement over the course of life and death (Haraway 2008, 5–15).

It is through consideration of the relational nature of archaeological assemblages that past animal agency may be accessed. By starting from a point of ontological flatness, the relationships articulated by the particular configurations of the different assemblages may be drawn forth. In addition to the osteological assemblage, one may include the depositional assemblage – the more-than-zooarchaeological assemblage that comprises multiple material types, the multi-scalar geographic and temporal assemblages, and also behavioural information and ethnographic comparatives.

Cattle in Neolithic Britain

That the introduction of fully-domesticated cattle to the British Isles in the Neolithic had a profound impact is well attested (Ray/Thomas 2003; 2018; Cummings/Morris 2022), with domestic cattle bone from features of this period frequently dominating osseous assemblages and to a degree that cannot be explained solely by taphonomic processes. Whilst human consumption of cattle bodies was undoubtedly important here, the depositional treatment of cattle bone marks out cattle, and domestic cattle in particular as different from other species, and although by no means homogenous, this difference emerges from the archaeological evidence across scales, from the sub-site to the regional and beyond. By unpicking the reasons for this difference in treatment through analyses of multiple different archaeological assemblages, cattle agency reveals itself.

Woodford G2 long barrow stood on Salisbury Plain, five kilometres south of Stonehenge (**figs 1-2**). Excavated in 1963 by Major and Mrs Vatcher in response to plough damage, publication was undertaken some twenty years later by Gingell (1986). The excavated structure included a flint cairn at the core of the barrow mound, the surviving body of the mound, two flanking ditches and associated pits. Gingell's report records the presence of disarticulated human bone beneath the cairn, an inhumation in the east ditch, cremated bone in two of the pits, and a small volume of animal bone deemed insufficient for reporting upon. Recent reanalysis of the excavated assemblage undertaken by the author from the Posthumanist position here advocated found a bone assemblage comprising over 3000 bone and tooth specimens, 86 of which were the disarticulat-

Fig. 1 Location of Woodford G2 long barrow in England, UK. – (Map M. Bolte, LEIZA).

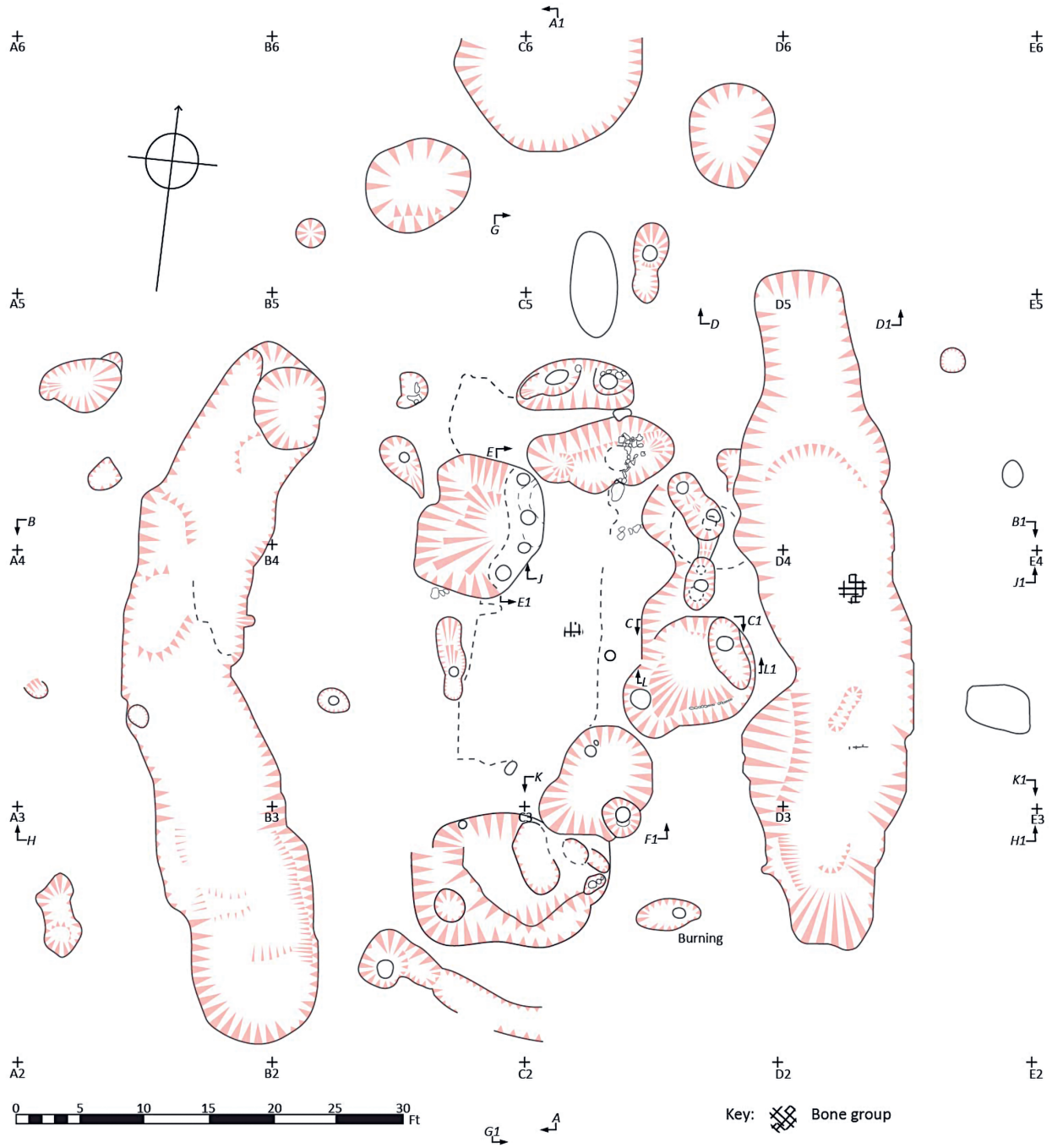

Fig. 2 Plan of Woodford G2 long barrow. – (Adapted from Gingell 1986, 17 fig. 7; with permission © Wiltshire Museum, Devizes).

ed human bones from beneath the flint cairn, with an MNI of three individuals. ^{14}C-dates revealed that this material dates to the Early Neolithic (3427–3370 cal BC at 68.2 % probability), whilst the ditch inhumation and the cremations all date to the Middle Bronze Age, the ditch inhumation returning a date range of 1244–1128 cal BC at 68.2 % probability.

The disarticulated human remains from beneath the cairn were deposited with a low number of fragments of seemingly residual sheep/goat remains and pottery sherds. The cairn covering this material comprised unstruck flint nodules, and cattle teeth and pedal bones were recovered from primary mound contexts, close to the cairn. This structure is strikingly similar to that of the nearby and much better known Fussell's Lodge long barrow, which was also formed around a flint cairn that overlay pits and post holes and sealed deposits of disarticulated human remains (Ashbee 1966), as well as two subadult »skeletons« that reanalysis of the assemblage found to be composites of multiple individuals (Wysocki et al. 2007, 67). At the proximal end of the Fussell's Lodge cairn were a deliberately placed cattle skull and pedal bones. Caroline Grigson's orig-

inal analysis of the faunal remains at Fussell's Lodge suggest that the organisation of these cattle remains might be indicative of a hide burial (Grigson 1966) – a form described by Stuart Piggott (1962) as having recurred across vast temporal and geographic expanses in which the head and hooves of usually a horse or cattle accompanied human remains. The presence of the bones of the head and hooves only suggests that they once formed part of a hide, the skin having long-since decomposed. The arrangement at Fussell's Lodge would have appeared as a sculptural human-cattle-flint composite: a multi-species chimera. At Woodford G2, a small assemblage of cattle teeth and bones were found close to the edge of the damaged flint cairn. Given the structural similarities between the two sites, it seems feasible that the cattle bones could have originally been organised in a form that echoes that seen at Fussell's Lodge.

The association between cattle remains, especially the skull and pedal bones, and human bones is one that is repeated across Early Neolithic contexts in the British Isles (Field 2006, 125–130; Banfield 2018), and one that is not encountered in comparable form, or with the same degree of frequency, in any other combination of species. The suggestion that there existed some form of kinship between cattle and humans has been explored by Ray/Thomas (2003), but the precise nature of the relationships articulated at Fussell's Lodge and Woodford G2 are revealed through attendance to the depositional detail. This enfolding of the human within the flint cairn, all of which was contained beneath the cattle hide suggests embrace or protection of the human and flint element by that of the cattle. Such a relationship of inter-species care is expressed through dairying, which has been shown to have been a well-attested practice from the outset of the British Neolithic, through the results of lipid reside analysis from pottery (Copley et al. 2005, 531; Cramp et al. 2014). Ongoing provision of sustenance by a living non-human to a human has more in common with human familial or close social relationships than with that between living hunter and soon-to-be-dead prey, the former relationship entailing commitment, care, mutual support and responsiveness, as the human is bound to provision fodder, water and protection for the cattle in exchange for access to milk. Further, milking demands regular, daily contact between cattle and humans, and the development of trust. Ethnographic evidence has found that humans must learn how to behave appropriately when interacting with animals – in this case, Mongolian sarlag (Fijn 2011, 134): »A calm, quiet person will extract more milk from a cow than a loud extrovert. Having a strange person present can also be inhibiting. Cows, particularly sarlag, are sensitive to any new people during milking, because they are not part of the cow's recognition of the milker as part of her ›herd‹, which includes both cattle and human members.«

Described above is evidence of sarlag agency: active selection for docile humans. The dairying relationship is thus one of calm familiarity, a possibility brought about by domestication and maintained by ongoing social contact.

Drilling down further into the evidence, the cattle bone from the Woodford G2 mound reveals still more of the human-cattle relationships bound up with the structure. They derive from at least one old animal – one with a long biography that would have been known as an individual, its story bound up with those who incorporated its remains into the barrow structure. Further, at least one of the cattle bones pertains not to domestic cattle, but to aurochs, with metric data falling within the upper threshold for prehistoric aurochs: a large bull. The sheer physicality of such an animal would have commanded attention and elicited response.

Aurochs, the wild progenitor species of domestic cattle, were already present in Britain when domesticated cattle were introduced (Lynch et al. 2008), and are known to have been hunted by human populations (for examples, see Rogers et al. 2018). Occupying wetland/woodland edge habitats (Lynch et al. 2008) and typically standing between 140 and 190 cm at the shoulder (Degerbøl/Fredskild 1970), their presence would have heightened differences from, and similarities with, the novel domesticates, rendering the latter uncanny.

Envelopment of the human and flint cairn within an aurochs, or aurochs-cattle composite hide therefore holds potential to change the nature of human-cattle relationship expressed: notions of protection of the human by cattle may remain, but through reference to behavioural characteristics, the inclusion of aurochs bull remains introduces elements of power and ferocity – a heightened form of the kind of fierce protection often witnessed in domestic cows defending their young from perceived threats, for instance. In life, this aurochs bull may have been a known presence to those who incorporated its remains into the barrow structure, but it remains that the human-aurochs relationship would have stood in marked contrast to the close sociality that bound humans with the domestic cattle who shared their lives.

But it is not just cattle and human bone that comprise the Woodford G2 and Fussell's Lodge deposits, with flint cairns forming important element of both. Comprising unstruck nodules, the cairns are a concentrated mass of flint tools-in-waiting. Flint tools

and the waste resulting from their preparation/production are ubiquitous presences in Neolithic and Bronze Age assemblages, and enabled the processing of dead animal bodies. Caches of flint nodules, flakes and worked pieces are frequently encountered in barrow ditches (for example, as at Amesbury 42, Netheravon Bake, Cold Kitchen Hill, Horslip, all in Wiltshire) and sometimes placed in depositional sequence with deposits of butchered cattle bone, as is the case at Fussell's Lodge. Butchery and consumption of cattle bodies by humans provided nutrition but also skins, horn, bone, sinew, and social capital between humans. The centrality of cattle whose living needs shaped the rhythms of human lives and vice versa extended to their deaths and through incorporation of flint – an important means by which post-mortem human-cattle relations were enacted – the cattle hides that covered the barrow cairns enclosed and encapsulated entire human-cattle lifeways.

Also noted as present in the Woodford G2 cairn assemblage are low numbers of residual sheep/goat specimens. The introduction of sheep/goat to the British Isles contrasts with that of cattle (and pig) through the absence of wild antecedents. However, lipid residue analysis infers that sheep/goat were reared and kept for human consumption of their meat rather than dairying (Copley et al. 2005, 528). Whilst requiring care through provision of fodder and protection from predators, the human-sheep/goat relationship was one of greater social distance and much lesser intensity than that which bound humans and cattle through the processes and rhythms associated with dairying. This social asymmetry may account for the kinds of sheep/goat deposits found in British Early Neolithic contexts: typically fragmentary, disarticulated portions of the body, broadly lacking convincing evidence for deliberate selection for deposition. Whist taphonomy inevitably is a factor to consider, it cannot explain the contrast with the treatment of cattle bone. Cattle elicited a sufficiently strong response from those who lived with them that demanded extraordinary treatment post-mortem.

Further evidence supporting this interpretation of a close social relationship of cattle-human nurture is found at Windmill Hill causewayed enclosure, Wiltshire. Early Neolithic deposits from this site include both animal and low numbers of human remains, the former notably including »large numbers of complete, or nearly complete, skulls and horncores of cattle« (Grigson 1999, 204). Two multi-species deposits are of particular interest: from context [630] was recovered a human child's femur inserted into a distal cattle humerus (Whittle et al. 1999, 110. 108 fig. 97; Grigson 1999, 205 fig. 161; 206), and in context [117] a fragment of a human child's cranium was found nested within a skinned cattle frontal (Whittle et al. 1999, 89–90 fig. 82). The nesting, enveloping quality of the cattle and subadult human bone recalls the multi-species cairn composites at Fussell's Lodge and Woodford G2 that place human and cattle remains in intimate, structured arrangements, again, making reference to concepts of care and nurture (cf. Ray/Thomas 2003; Harris 2011, 368), in death as in life.

Conclusions: But Which Animal Do You Mean (to Follow)?

Domesticated species are knowledgeable agents that act to shape the worlds we inhabit now and in the past. Outright denial of their agency, whether deliberate or an unquestioned assumption is a modern attitude that must be guarded against. We must start with the evidence from a position of ontological flatness and allow space for difference to emerge if we are to understand the true complexity of interconnected multi-species worlds.

In the British Early Neolithic contexts considered, the degree to which cattle elicited human response is arguably far more significant than the ways in which humans elicited cattle responses. The introduction of already domesticated cattle demanded fundamental shifts in human lifeways in order to effect their care and survival. Human lives had to be reoriented to accommodate access to pasture/fodder year-round, access to water sources with capacity for sustaining large animals in addition to human groups would have been needed, as would ensuring the security of cattle to protect from predation/theft. Dairying would have demanded daily interactions and the development of trusting relationships between individual cattle and humans, whilst the processes associated with the storage and processing of dairy products would in turn have their own implications for human lives – the production and storage of pottery vessels that would have impact upon the practicalities of moving homesteads to accommodate requirements for pasture, etc. (Banfield 2018, 98). In short, the adoption of domestication in the British Isles was a complex process of mutual responsiveness articulated primarily through the interactions between humans and cattle, and it is by no means clear whether it was the human or non-human animal that was leading the dance.

Adoption of a Posthumanist approach to the evidence has enabled the tracing of entangled human-cattle relations, revealing agentive behaviour that transcends species. Through weaving together multiple strands of evidence – archaeological; behavioural; ecological – and exploring the complex relations emergent from the different assemblages explored, and working across scales from that of the individual animal to species, from deposit to region, and crucially, by starting from a point of ontological flatness that gives space for the evidence to drive the emergent narrative, animal agency is revealed, enabling novel understandings of our shared past to unfold.

Bibliography

Ashbee 1966: P. Ashbee, The Fussell's Lodge long barrow excavations 1957. Archaeologia 100, 1966, 1–80.

Banfield 2018: E. Banfield, Tales from The Ontological Tern: an examination of the role and meaning of faunal remains in the Neolithic long barrows of Wiltshire [PhD thesis Univ. Leicester 2018].

Barad 2007: K. Barad, Meeting the Universe Halfway (Durham NC 2007).

Bennett 2010: J. Bennett, Vibrant Matter: A Political Ecology of Things (London 2010).

Boyd 2017: B. Boyd, Archaeology and Human-Animal Relations: Thinking Through Anthropocentrism. Annu. Rev. Anthr. 46, 2017, 299–316.

Copley et al. 2005: M. S. Copley / R. Berstan /A. J. Mukherjee / S. N. Dudd / V. Straker / S. Payne / R. P. Evershed, Dairying in antiquity. III. Evidence from absorbed lipid residues dating to the British Neolithic. Journal Arch. Scien. 32, 2005, 523–46.

Cramp et al. 2014: L. J. E. Cramp / J. Jones / A. Sheridan / J. Smyth / H. Whelton / J. Mulville / N. Sharples / R. P. Evershed, Immediate replacement of fishing with dairying by the earliest farmers of the northeast Atlantic archipelagos. Proc. Royal Soc., Ser. B 281, 2014, 1–8.

Cummings/Morris 2022: V. Cummings / J. Morris, Neolithic Explanations Revisited: Modelling the Arrival and Spread of Domesticated Cattle into Neolithic Britain. Environmental Arch. 27(1), 2022, 20–30.

DeLanda 2006: M. DeLanda, A New Philosophy of Society. Assemblage Theory and Social Complexity (London 2006).

Deleuze/Guattari 2004: G. Deleuze / F. Guattari, A Thousand Plateaus: Capitalism and Schizophrenia (London 2004).

Degerbøl/Fredskild 1970: M. Degerbøl / B. Fredskild, The Urus (*Bos Primigenius Bojanus*) and Neolithic Domesticated Cattle (*Bos Taurus Domesticus* Linné) in Denmark (Copenhagen 1970).

Derrida 2008: J. Derrida, The Animal That Therefore I Am (ed. by M.-L. Mallet) (New York 2008).

Field 2006: D. Field, Earthen Long Barrows: The Earliest Monuments in the British Isles (Stroud 2006).

Fijn 2011: N. Fijn, Living with Herds: Human-Animal Coexistence in Mongolia (Cambridge 2011).

Fowler/Harris 2015: Ch. Fowler / O. J. T. Harris, Enduring relations: exploring a paradox of new materialism. Journal Mat. Culture 120, 2015, 127–148.

Gingell 1986: Ch. Gingell, A long barrow, Woodford G2, south of Druids Lodge. In: Ph. Harding / Ch. Gingell The excavation of two long barrows by F. de M. and H. F. W. L. Vatcher. Wiltshire Arch. and Natural Hist. Magazine 80, 1986, 7–22 (15–22).

Grigson 1966: C. Grigson, The Animal Remains from Fussell's Lodge Long Barrow. In: P. Ashbee, The Fussell's Lodge long barrow excavations 1957. Archaeologia 100, 1966, 1–80 (63–73).

1999: C. Grigson, The mammalian remains. In: A. Whittle / J. Pollard / C. Grigson (eds), The Harmony of Symbols. The Windmill Hill Causewayed Enclosure (Oxford 1999) 164–252.

Hacigüzeller 2012: P. Hacigüzeller, GIS, critique, representation and beyond. Journal Social Arch. 12, 2012, 245–263.

Hamilakis/Overton 2013a: Y.Hamilakis / N. Overton, A manifesto for a social zooarchaeology. Swans and other beings in the Mesolithic. Arch. Dialogues 20, 2013, 111–136.

2013b: Y. Hamilakis / N. Overton, A multi-species archaeology. Arch. Dialogues 20, 2013, 159–173.

Haraway 2008: D. Haraway, When Species Meet (Minneapolis 2008).

Harris 2011: O. J. T. Harris, Constituting childhood: conviviality and community at Windmill Hill. In: M. Lally / A. Moore (eds), (Re)thinking the Little Ancestor: New Perspectives on the Archaeology of Childhood and Infancy. BAR Internat. Ser. 2271 (Oxford 2011) 122–132.

Hodder/Meskell 2011: I. Hodder / L. Meskell, A »Curious and Sometimes a Trifle Macabre Artistry«. Some Aspects of Symbolism in Neolithic Turkey. Current Anthr. 52(2), 2011, 235–263.

Honeychurch/Makarewicz 2016: W. Honeychurch / Ch. A. Makarewicz, The Archaeology of Pastoral Nomadism. Annu. Rev. Anthr. 45, 2016, 341–359.

Lynch et al. 2008: A. H. Lynch / J. Hamilton / R. E. M. Hedges, Where the wild things are: aurochs and cattle in England. Antiquity 82, 2008, 1025–1039.

Maltby 2014: M. Maltby, Recording butchery and bone working. In: P. Baker / F. Worley (eds), Animal Bones and Archaeology. Guidelines for Best Practice (Swindon 2014) 36–37.

Mannermaa 2013: K. Mannermaa, On whooper swans, social zooarchaeology and traditional zooarchaeology's weight. Arch. Dialogues 20, 2013, 152–155.

Piggott 1962: S. Piggott, Heads and hoofs. Antiquity 36, 1962, 110–118.

Ray/Thomas 2003: K. Ray / J. Thomas, In the kinship of cows: the social centrality of cattle in the earlier Neolithic of southern Britain. In: M. Parker Pearson (ed.), Food, Culture and Identity in the Neolithic and Early Bronze Age. BAR Internat. Ser. 117 (Oxford 2003) 37–44.

2018: K. Ray / J. Thomas, Neolithic Britain: The Transformation of Social Worlds (Oxford 2018).

Reid 2020: A. Reid, Putting the Life Back into Livestock in Archaeology. Arch. Internat. 22(1), 2020, 114–126.

Rogers et al. 2018: B. Rogers / K. J. Gron / J. Montgomery / D. R. Gröcke / P. Rowley-Conwy, Aurochs hunters: the large animal bones from Blick Mead. In: D. Jacques / T. Phillips / T. Lyons (eds), Blick Mead: exploring the »first place« in the Stonehenge landscape. Archaeological excavations at Blick Mead, Amesbury, Wiltshire 2005–2016 (Oxford 2018) 127–152.

Russell 2012: N. Russell, Social Zooarchaeology. Humans and Animals in Prehistory (Cambridge 2012).

Sykes 2014: N. Sykes, Beastly Questions. Animal Answers to Archaeological Issues (London 2014).

Veitch 1901: J. Veitch (transl.), The Method, Meditations and Philosophy of Descartes (New York 1901).

Whittle et al. 1999: A. Whittle / C. Grigson / J. Pollard, The 1988 excavations. In: A. Whittle / J. Pollard / C. Grigson (eds), The Harmony of Symbols. The Windmill Hill Causewayed Enclosure (Oxford 1999) 73–115.

Wysocki et al. 2007: M. Wysocki / A. Bayliss / A. Whittle, Serious mortality: the date of the Fussell's Lodge long barrow. Cambridge Arch. Journal 17, 2007, 65–84.

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Hunter, Huntress and Animal Hunting Assistant as Human's Close Companion

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Raminta Skipitytė

Hunting Dogs and Hunting with Dogs in the Grand Duchy of Lithuania during the 13th to 17th Centuries AD

ABSTRACT

In recent years, interdisciplinary studies of dog remains from the late Middle Ages (13th to 15th centuries) and the early Modern Period (16th to 17th centuries) found in Lithuania have provided data on the morphology, health and diet of these animals. A particularly rich collection of dog remains (NISP 590) was gathered at Vilnius Lower Castle, and the status of this site allows us to relate the dogs found to the elite of the periods discussed. According to historical records, the function of most elite dogs was hunting, and remains found in elite residences are likely to belong to canines used for this purpose. Here we will discuss details of the care, diet and use of hunting dogs in the Grand Duchy of Lithuania, characterise the size and morphotype of 13th to 17th century dogs found at several sites and try to find some similarities between the archaeological evidence and the elite hunting dogs described in historical records.

KEYWORDS

Hunting dogs / morphotype / diet / Vilnius Lower Castle / late Medieval Period / early Modern Period / eastern Baltic

General Remarks

The key topics of this article are late medieval and early Modern Period dogs and hunting. Both topics have been studied quite widely in Europe (e. g. Manning 1993; Almond 2003; Samsonowicz 2011; Sykes 2018). Different aspects of late medieval and early Modern Period hunting are also discussed in the works of Lithuanian researchers (Mickūnaitė 2009; Piličiauskienė/Blaževičius 2018; Zarankaitė-Margienė 2018a; 2018b). Meanwhile, dogs, especially their skeletal remains, are still poorly studied in Lithuania despite the exceptional status and popularity of the dog in public society. Much more has been done on the historical research of dogs in the Grand Duchy of Lithuania (hereinafter: GDL), one of the most important studies being the one by Ragauskienė (2010). The history of the native Lithuanian hound breed is discussed by Smetona et al. (2021). The latter study represents research of cynologists and hunting specialists, which provides valuable insights into hunting with dogs in the early Modern Period. In recent studies (Ragauskienė 2010; Smetona et al. 2021) the authors have attempted to relate several types of dogs mentioned in the historical records to modern breeds. However, intensive controlled breeding has only been widely practiced in the Modern Period and most breeds have only been established within the last 200 years from a small number of founders (Ostrander et al. 2019, 810, and references therein; Nichols 2021). Thus, in this paper, 13th to 17th century dogs will not be linked to modern breeds. As there is a lack of interdisciplinary surveys that combine research on dogs and hunting from different disci-

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plines in Lithuania, our paper is just an attempt to fill this gap.

Hunting was the main form of entertainment among the nobility in the Middle Ages and the early Modern Period, a form of political interaction that was also correlated with economic benefits (Jaworski 2001; Petrauskas 2003). In the 14th and 15th centuries, all Grand Dukes of Lithuania were great hunting enthusiasts, and they devoted a lot of time to the sport. Dogs were one of the most important participants in hunting; around a hundred hunting dogs were owned by Grand Duke of Lithuania (hereinafter: GdL) Vytautas (*c.* 1350–1430) and his cousin Jogaila, King of Poland (Polish: Jagiełło, 1352–1434). To compare – in 1415, Jogaila had also 30 to 40 birds of prey (Jaworski 2001, 50). Jogaila's wife, Queen Jadwiga (1373–1399), also owned dogs, but she did not hunt herself; her dogs were used by guests and courtiers. The widow of GdL Švitrigaila (1370–1452) also kept dogs (*Lietuvos Metrika*; Kręt 1981). Sigismund I the Old, King of Poland and GdL (1467–1548), and his wife, Queen Bona Sforza d'Aragon (1494–1547), were also fond of hunting with dogs. Their son, Sigismund II Augustus (1520–1572), was an avid hunter, keeping about 140 dogs and reportedly spending as many as 223 days on the hunting estates of the GDL in 1546. The nobility loved to hunt, and hunting was a career path for many of them. Meanwhile, peasants were forbidden to hunt, thus they did so illegally, by poaching (Ragauskienė 2010, 33–34).

The dog was a key player in hunting and an important companion of the upper classes in the GDL. The Balts – Lithuanian and Prussian tribes – still used to bury their dead with their dogs as recently as 500 years ago. According to historical records, in the 14th century, both Lithuanian Grand Dukes and ordinary people were still cremated or buried uncremated with their dogs (Dusburg, *Chronicon* 5 [p. 334]; Marburg, *Cronica* IX. 133 [p. 463]; Długosz, *Historia* [p. 551]). This custom is also evidenced by archaeological data. Numerous graves of humans and horses buried with dogs were found in Lithuanian burial sites dating to the 10th to 15th centuries (Urbanavičius 1980; Svetikas 1982; Varnas 1994; 1996; Bertašius 2009). Written records from the 15th to 17th centuries reveal that hunting dogs were expensive and of great importance in the GDL. They were a popular gift among the elite and even the object of theft, their diet was strictly regulated, and they were under the care of a team of special officers (Ragauskienė 2010; Zarankaitė-Margienė 2018a; 2018b). However, by the end of the 16th century, the popularity of hunting was already declining with a growing interest in science and spiritual issues, and the prices of hunting dogs and hunting birds more than halved (Mickūnaitė 2009; Ragauskienė 2010). With the shifting attitudes towards hunting and with its traditions changing, the types of dogs bred by the nobility also changed. Changes in dog breed preference are reflected not only in the prices of canines, but also in the morphotype of the animals, which will be discussed in more detail below.

Recent dog studies became possible after the large-scale archaeological investigations at Vilnius Lower Castle (hereinafter: VLC) from 1988–2014. This castle was the residence of the GdL from the 13th century. In 1569, the GDL and the Kingdom of Poland were united into a single state, which created one of the largest countries in Europe at the time: the Polish-Lithuanian Commonwealth. Thus, VLC then also became the residence of the Commonwealth King in Lithuania.

During the excavations at the castle, a zooarchaeological assemblage of about 80,000 specimens was collected and examined (Piličiauskienė/Blaževičius 2018). The excavations provided a unique collection of dog remains (590 bones and bone fragments), which formed the basis for the research presented in this publication. Interdisciplinary studies of dog remains found at the castle and at other sites in Lithuania have provided data on the morphotype, health, diet, and origin of these 13th to 17th century dogs, and the results of these investigations have become the basis for several forthcoming publications.

As historical records indicate, hunting was the main function of elite dogs in the Middle Ages and the early Modern Period. Therefore, dogs found in elite residential environments were most likely used for hunting. In this article, we will discuss the details of care, diet and use of hunting dogs, and the changes in the canines' morphotype in the GDL during the medieval and early Modern Periods.

Material and Methods

The zooarchaeological material discussed in the study was collected during the archaeological excavations at VLC, Vilnius and Kaunas towns, Klaipėda (formerly Memelburg) Castle and town, and in a number of small Lithuanian towns (**fig. 1**). Although data collection was carried out for dog remains found in many different areas of Lithuania, this publication will mainly focus on individuals found at VLC. The zooarchaeological finds dating back to the 13th to the middle of the 14th centuries reflect the

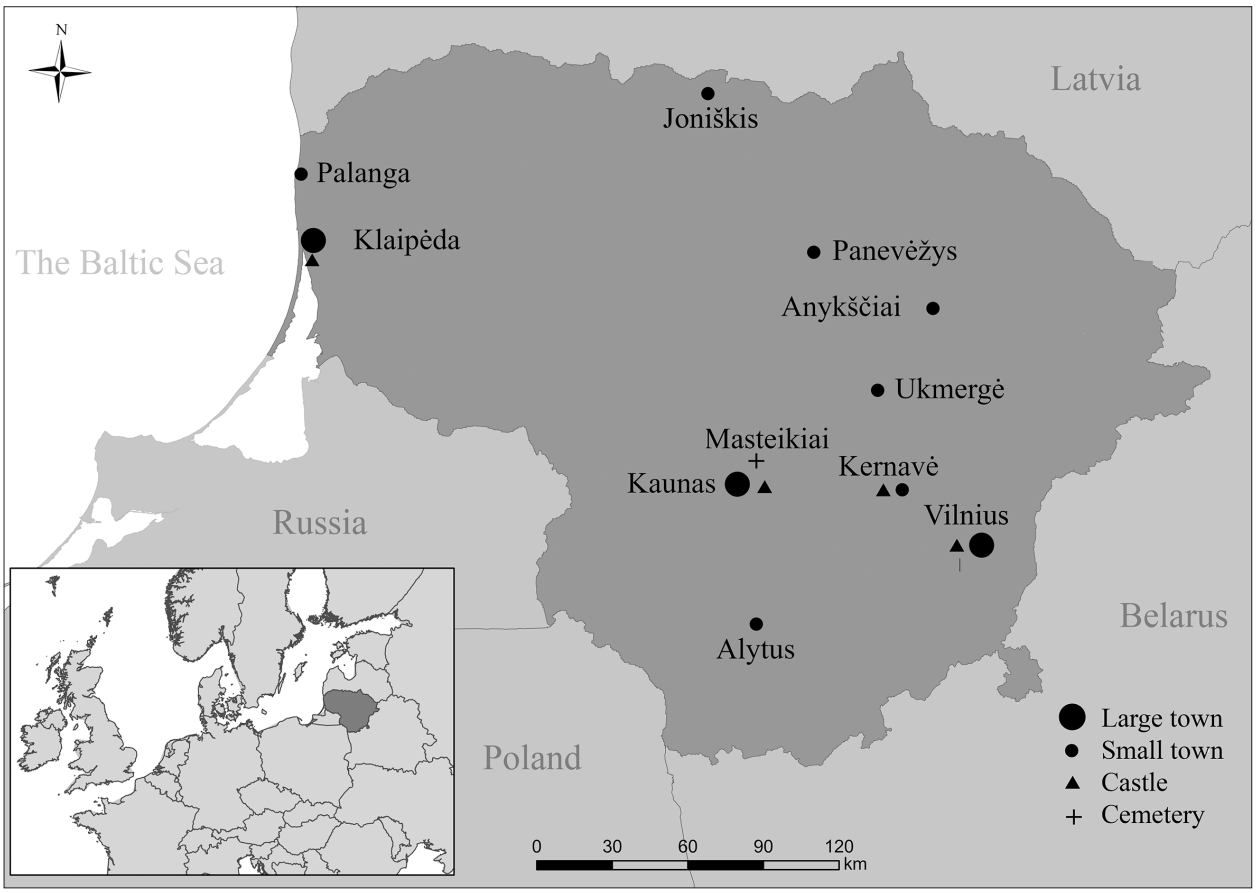

Fig. 1 Location of sites with dog remains analysed. – (Map G. Piličiauskienė / V. Micelicaitė).

stage of the construction of the castle, and the late 14th to 15th centuries represent the period of its prosperity. In the early 16th century, a new palace of the Grand Dukes of Lithuania was built on the site of this castle, and this complex survived until the late 17th century. The castle itself was abandoned after a Muscovite attack in the middle of the 17th century, and it was completely demolished at the beginning of the 19th century. The dogs analysed in this study were found during the excavations of 1988–2014, in the layers dated to the 13th to 17th centuries (Piličiauskienė/Blaževičius 2018).

At VLC, 590 dog bones and bone fragments belonging to at least 51 individuals were found. In accordance with the castle's stages of development and their clear stratigraphy, the dogs' remains were divided into two chronological groups for further research: 13th to 15th centuries and 16th to mid-17th centuries.

Zooarchaeological studies were carried out at the Zooarchaeology Laboratory of Vilnius University. The bones were measured using the method introduced by A. von den Driesch (1976). Age estimation was based on epiphyseal fusion, tooth eruption (Silver 1969) and tooth wear stage (Horard-Herbin 2000). The dogs' height at withers was calculated according to the coefficients of R. A. Harcourt (1974). When more than one bone used to calculate height was preserved per individual, the average height was taken. Based on their height at withers, the dogs were classified into seven categories (according to Belhaoues 2011; Hourani 2018): dwarf (<25 cm), very small (25–29 cm), small (30–39 cm), medium (40–49 cm), medium large (50–59 cm), large (60–69 cm), and very large (≥70 cm). According to the skull index (greatest zygomatic breadth/total length) the dogs can be divided into three categories: dolichocephalic, mesocephalic, brachycephalic (Hourani 2018, and references therein).

To better describe the morphotype of the dog, the skulls of archaeological individuals were compared with those of modern dogs, and the limb slenderness index (SI = SD*100/GL, where SD is the minimum width of the diaphysis and GL corresponds to the total bone length) was estimated from the radii. However, the aim of this analysis was not to identify any »breeds«, just to compare the shapes of the dogs. To compare the skulls, we used the cranial index (30*100/1) and the palatal index (34*100/13; see Harcourt 1974; Hourani 2018). The measurements in the indices correspond to the descriptions by von den Driesch (1976). Modern dog breed radii and

cranial data were taken from Wagner (1930); additionally, skeletons of three more modern dogs (two Lithuanian hounds and one Caucasian Shepherd) from the Vilnius University Osteological Collection were used. The pathologies were determined by dog surgeon and orthopaedist-traumatologist, Dr. Valdas Vaitkus, former associate professor of the Lithuanian Veterinary Academy.

The dogs' remains from VLC are stored in the National Museum – Palace of the Grand Dukes of Lithuania, and skeletal remains from all other sites are stored in the Zooarchaeological Repository of Vilnius University, Faculty of History.

Results and Discussion

Dogs in Lithuania: Archaeological and Zooarcheological Data

The oldest dog remains in Lithuania are recorded from the sites where abundant zooarchaeological material has been found. The earliest dogs are known from the Šventoji 43 settlement site (3900–3700 cal BC) in coastal Lithuania (Piličiauskas et al. 2019). Canines dated to the 4th millennium BC have also been found at Daktariškės 5 (western Lithuania) and at the Kretuonas (eastern Lithuania) sites (Daugnora/Girininkas 1996). However, at the latter two sites there were also finds from later periods, so the exact number of dog remains from the Subneolithic remains unclear. Pendants made from a dog or wolf tooth have been found in Late Mesolithic burials in Donkalnis cemetery in western Lithuania (Piličiauskas et al. 2017). Unfortunately, the remains of dogs from the oldest sites are scarce, highly fragmented and provide little information about the animals themselves. More can be said about the dogs from the Šventoji 4 and 23 sites (3000 cal BC), where at least twelve individuals were found. The skulls, mandibles and long bones indicate that all these dogs were medium-sized individuals about 40 cm in height (Piličiauskienė, unpublished data). Interestingly, canine remains are almost absent in Bronze Age zooarchaeological material (Luik et al. 2022; Micelicaitė et al. 2023; Piličiauskienė, unpublished data), and only very scarce fragments of dog teeth and bones have been found among the faunal remains from Iron Age sites (Piličiauskienė, unpublished data).

Around the 10th/11th century, a new practice of burying dogs appeared in Lithuania: dog remains are found buried together with humans or horses. Some of the earliest graves are known from the Marvelė burial site in central Lithuania (Bertašius 2002; 2009). Unfortunately, in almost all cases, information about the canines or their skeletal parts found in the burials is only available from archaeological reports, and the remains of the animals have not been stored until now.

The practice of burying dogs lasted until the end of the 14th century or even the beginning of the 15th century AD, i. e. after the Christianisation of Lithuania in 1387. Dogs buried with humans or horses have been found in the cemeteries at Obeliai, Masteikiai, Bazorai, Griežė, and also other burial grounds. Unusual dog burials are known from Masteikiai cemetery in central Lithuania. The cemetery dates to the 12th to 14th centuries AD and has humans and horses buried separately (Varnas 1994; 1996). In the horse graves 21, 22, 26, 36, also remains of dogs were found – one mandible in each grave. The dog mandible from grave 26 was dated to 1163–1265 (842 ± 28 BP; FTMC-SN30-1). Two more mandibles were found in disturbed graves. It is worth mentioning that five of the six mandibles were right-sided ones. Despite the archaeological report, according to which more complete dog skeletons were found in horse burial 26, individual remains from this grave include only some vertebrae and a few small fragments of long bones. All mandibles found in the Masteikiai cemetery were very similar in size, belonging to five medium to large dogs and one large one. The length of the Masteikiai dogs' mandibles was similar to that of a German Pointer's, but the bones were much more robust (Piličiauskienė 2023). Two exceptional dog burials were found in the late 14th to early 15th century Bazorai cemetery (southern Lithuania), where two human burials with dogs were found. In grave 54, the skeleton of a dog was found next to a child (**fig. 2, 1**), and in grave 19, a dog was lying on a woman's legs (**fig. 2, 2**; see Svetikas 1982). It is likely that hunting dogs might have been buried in the cemeteries, as the historical sources mention such a tradition.

In the late medieval and early Modern Period castles and towns, dog remains are scarce, usually accounting for 1–2 % or less of all identified mammal bones (e. g. Baublienė et al. 2004; Piličiauskienė/Blaževičius 2018; Ehrlich et al. 2020; Piličiauskienė,

Fig. 2 Bazorai cemetery graves with dog remains, late 14th to early 15th centuries. **1** child's grave no. 54 with the dog lying to the right of the deceased. – **2** female grave no. 54 with the dog lying on the woman's legs. – (Photos after Svetikas 1982).

unpublished data). The functions these animals had, whether hunting or guarding, would be impossible to determine. Defining the function of a dog is much more problematic than assessing the type of dog. A single individual can be used for a wide variety of purposes, or it can simply be a pet and status symbol (Harcourt 1974; Nichols 2021). In addition, dogs with very similar morphotypes can perform different functions, for example Collies and English or Arabian sighthounds. The former are shepherd dogs, and the latter are hunting dogs, but the osteometric data and the general morphotype of all these canines are very similar. Moreover, a hunting or guard dog does not necessarily have to be large (e. g. dachshunds, Jack Russell terriers). As early as the middle of the 19th century, very good local hounds less than 30 cm tall were used in Lithuania (Dmitrij V. 1876, 27). Thus, we can only assume that the dogs found in high social strata contexts were most likely hunting animals. This is suggested by the fact that hunting was a privilege and a popular activity of the elite in general. Moreover, the fact that hunting was the main function of the elite dogs is suggested by medieval and early Modern Period records (see below).

Size and Type of the Dogs: Zooarchaeological Data

Only DNA analysis can reliably demonstrate links between the medieval and early Modern Period dogs with current breeds. Through morphological studies, we have tried to reconstruct a more detailed portrait of the dogs in archaeological contexts to test our hypotheses about the uniqueness of the VLC dogs, and the changing types of hunting dogs in the early Modern Period.

In VLC, the remains of at least 51 individuals were recovered, but only a relatively small number of them were suitable for further detailed analysis, as many of the bones were fragmented and non-informative. The height could be determined for 20 dogs from the 13th to 15th centuries as well as for 14 individuals from the later period of the castle, dated to the 16th to mid-17th centuries.

In the 13th to 15th centuries, dogs varied greatly in height and build, from very small 28-cm-individuals to very large ones of 74–75 cm. The average height of the castle's dogs from this period was 53.4 cm (**fig. 3**). Meanwhile, in the later phase of the castle, the dogs were smaller than in former centuries, with an average height of 50.2 cm, and sizes ranging from 31 cm to 74 cm.

When comparing the size of the dogs from both VLC periods with canines found in the largest Lithuanian cities (Vilnius and Kaunas), and also in small towns, in the Teutonic Order's Memelburg Castle (present-day Klaipėda) and in the Prussian town of Memelburg (present-day Klaipėda), it turns out that the largest dogs were found at Memelburg Castle (57.3 cm). The dogs from Vilnius Lower Castle (53.4 cm) were very similar in mean height to those from Vilnius and Kaunas towns, with 54.3 cm and 53.1 cm respectively. Meanwhile, the smallest animals were found in the early Modern Period layers of VLC, Memelburg (Klaipėda) town and in small towns in Lithuania, with an average height of 50.2 cm, 45.9 cm and 47.3 cm, respectively (**fig. 3**).

The large size of the dogs from Vilnius and Kaunas towns was surprising, as usually smaller canines are found in urban areas (Prummel 1992; Makowiecki 2006; Tourunen 2008). Possibly, some of the animals from Vilnius and Kaunas might have been expensive and specialised hunting dogs that may have belonged to nobles who owned estates in the town. This assumption would be suggested by the abundance of large 60–66 cm individuals from Vilnius. These dogs were about 10 cm larger than the average

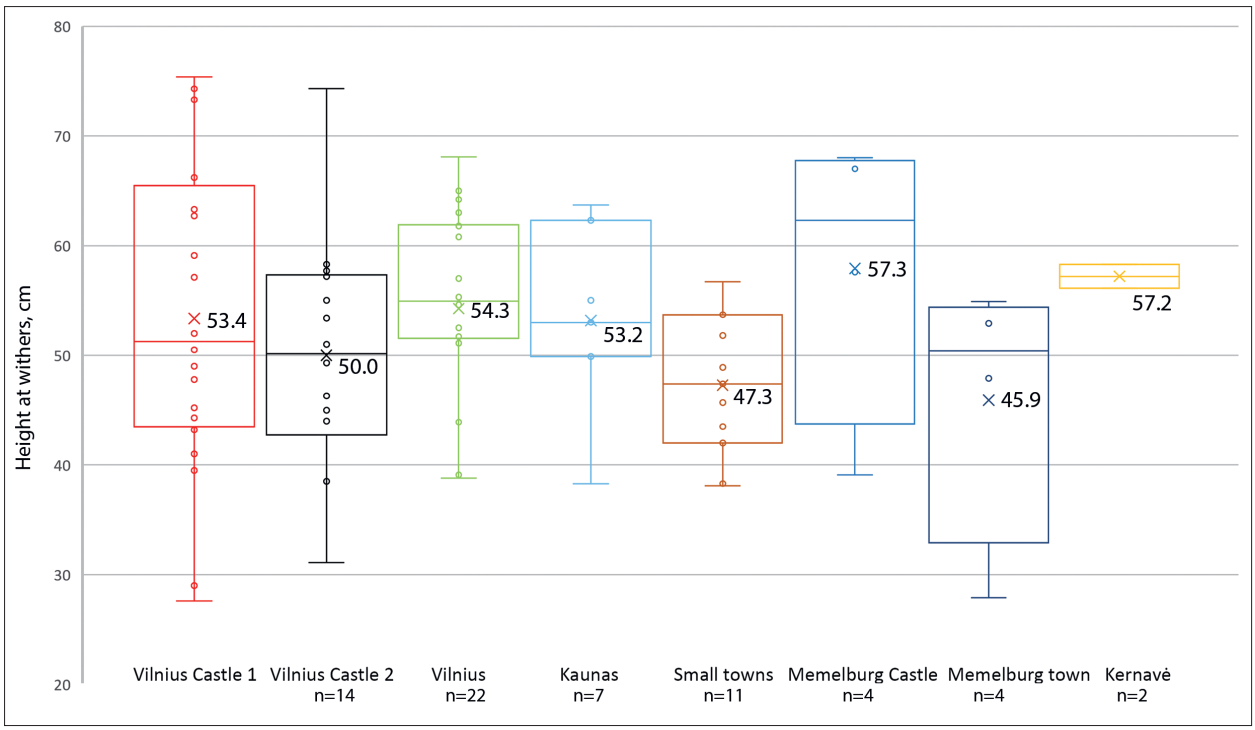

Fig. 3 Dogs' height at withers in cm at the sites mentioned in this study. Vilnius Castle 1: Vilnius Lower Castle, 13th–15th centuries. – Vilnius Castle 2: Vilnius Lower Castle, 16th–17th centuries. – Vilnius and Kaunas towns: 16th–18th centuries. – Small towns: 16th–18th centuries. – Memelburg Castle: present-day Klaipėda Castle, late 13th–16th centuries. – Memelburg town: present-day Klaipėda town, 16th–18th centuries. – Kernavė medieval town and hillfort: 13th–14th centuries. – For sites and their location see **fig. 1**. Numbers indicate the average height of the dogs; the line indicates the median. – (Graphics G. Piličiauskienė).

city dog. On the other hand, they may also have been the large guard dogs of the city dwellers. In addition, the finer bones of smaller individuals were probably collected less often. The smallest dogs were kept in small towns. It cannot be ruled out that they were used for hunting, but the status of the small towns and their inhabitants makes it highly doubtful that they kept expensive breed dogs. Besides, some individuals from the large and small towns were most likely stray animals.

Although the mean height of the dogs from VLC is not the highest, the uniqueness of these dogs is reflected in their general height profile and height diversity. The standard deviation (SD) for the 13th–15th-centuries dogs' height was 14.2 cm, while the SD for the dogs' stature from the later phase of the castle was slightly lower (SD = 10.7 cm). At Memelburg Castle, canines also varied considerably in size (SD = 13.4 cm). Meanwhile, animals from Vilnius and Kaunas towns had a very similar SD in height of 8.9 cm and 8.6 cm, respectively, and the small towns' dogs varied the least (SD=6.4 cm). The wide variety in the size of the VLC dogs can be related to the exceptionally high status of the castle and its inhabitants. Expensive dogs of different functions and types, those mentioned in the three Statutes of Lithuania, had to be kept in the Grand Duke's environment (Piličiauskienė 2023; Piličiauskienė et al. 2024). As already mentioned, most of them are thought to have been hunting dogs. Meanwhile, the variety of dogs in the towns was lower. Due to the high price of »bred« individuals, the middle and lower classes living in large, and even more so in small towns had to keep mainly guard dogs of local origin (mongrels) rather than special hunting canines. Moreover, as R. Ragauskienė (2010) points out, peasants, most of whom were serfs, rarely kept dogs due to lack of food for them; they usually borrowed them when going on illegal hunts.

At VLC, both the smallest and the largest dogs were found, ranging in height from 28 cm to 75 cm. Only here, at the residence of the Grand Duke, were very large individuals over 70 cm recorded, and they made up as much as 15 % of the 13th–15th-centuries dogs at this site. Overall, animals larger than 60 cm accounted for 35 % of the dogs from the medieval phase of the castle (**fig. 4**).

However, a completely different situation with the VLC dogs is observed later, in the 16th to 17th centuries. Although one 74.3 cm sized individual was assigned to this period, most dogs were considerably smaller. The largest size group in the castle during this period was that of medium-large (50–59 cm) dogs (42.9 %), while individuals between 40–59 cm

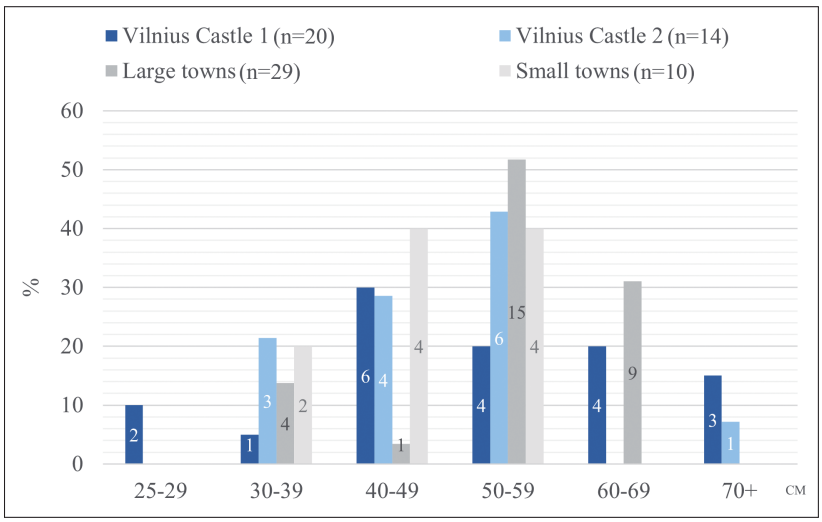

Fig. 4 Dog size groups. Vilnius Castle 1: Vilnius Lower Castle, 13th–15th centuries. – Vilnius Castle 2: Vilnius Lower Castle, 16th–17th centuries. – Large towns including Vilnius and Kaunas: 16th–18th centuries. – Small towns: 16th–18th centuries. – For sites and their location see **fig. 1**. Number of individuals given in the centre of bars. – (Graphics G. Piličiauskienė).

accounted for 71.4 % of the total. This height pattern is more similar to that of the large and small towns' dogs, where 40–51.7 % of the individuals were between 50–59 cm tall. The remaining 60 % of the small towns' dogs were even smaller, from 30–49 cm in height (**fig. 4**). The difference between the height categories of canines from the 13th–15th-century castle and the later castle phase, plus the large and small towns' groups, is statistically significant ($p < 0.01$). The height pattern of the small towns' dogs is also significantly different ($p < 0.01$) from that of the other sites.

Small-sized dogs in the periphery were predictable; however, the size decrease of the castle dogs in the 16th and 17th centuries was somewhat unexpected. Such a shift can probably be explained by a change in »dog trends« and the request for different types of canines, rather than by a reduced financial capacity of the king and the elites and the decision not to obtain the most expensive large dogs. As was discussed above, changes in the dog types bred and the declining status of hunting in general are reflected in the decreasing prices of dogs and game birds recorded in the three Statutes of Lithuania.

In the 12th to 18th centuries, dogs of different morphotypes were bred in the territory of present-day Lithuania (**figs 5-6**), and the greatest diversity of dogs was observed at medieval castles. Here, the main types of animals are found, which include small »toy« dogs (lapdogs), tall and slender sighthounds, large Molossians and Spitz-type individuals of various builds. In the early Modern Period, the variety of dogs decreased, with very small individuals, sighthounds and Molossians almost disappearing, and only Spitz-type animals being found in small towns and cities (Piličiauskienė 2023). These changes in dog types bred are also seen when comparing their cranial and palatine indices: the skulls of individuals from medieval sites were on average longer and narrower, and a significant number of sighthound-type dogs from this period are found (**figs 5-6**).

Sighthound-type dogs were found at all the medieval castles studied, including Kernavė, Vilnius Lower Castle and Memelburg/Klaipėda Castle. They are only found at medieval sites and mostly in the environment of the elite. For centuries, sighthounds have been related to the elite and identified as a status symbol. Sighthounds are particularly common in the graves of the Scandinavian elite from the Migration Period or even earlier (Öhman 1983; Sten 2013; Nichols 2021).

In Lithuania, the earliest dog graves are dated to the early 2nd millennium AD and the types of dogs buried are, with the exception of the Masteikiai cemetery, unknown. Undoubtedly, sighthounds were widespread in Lithuania, at least from the 13th century onwards. They remained high status elements and were often bred by the elite until the 16th century. However, in the early Modern Period, there was a clear decline in the popularity of this type of dog. This can be seen in the decrease in the prices of sighthounds and the scarcity of their skeletal remains in the early Modern Period; the phenomenon is also confirmed by 19th-century records (see below). It is worth noting that sighthounds were not popular at Memelburg/Klaipėda Castle, where the remains are characterised by those of large and robust Molossian-type dogs, which are far less common in the zooarchaeological material from the GDL castles (Piličiauskienė 2023).

One of the most impressive dogs (ID 8) we analysed was found at VLC and dated to 1302–1410 (Piličiauskienė et al. 2024). This dog was 74.3 cm high, with a gracile build and a nearly ultradolichocephalic cranium shape (index 45.1) The narrow and long skull of this individual is, according to the cranium

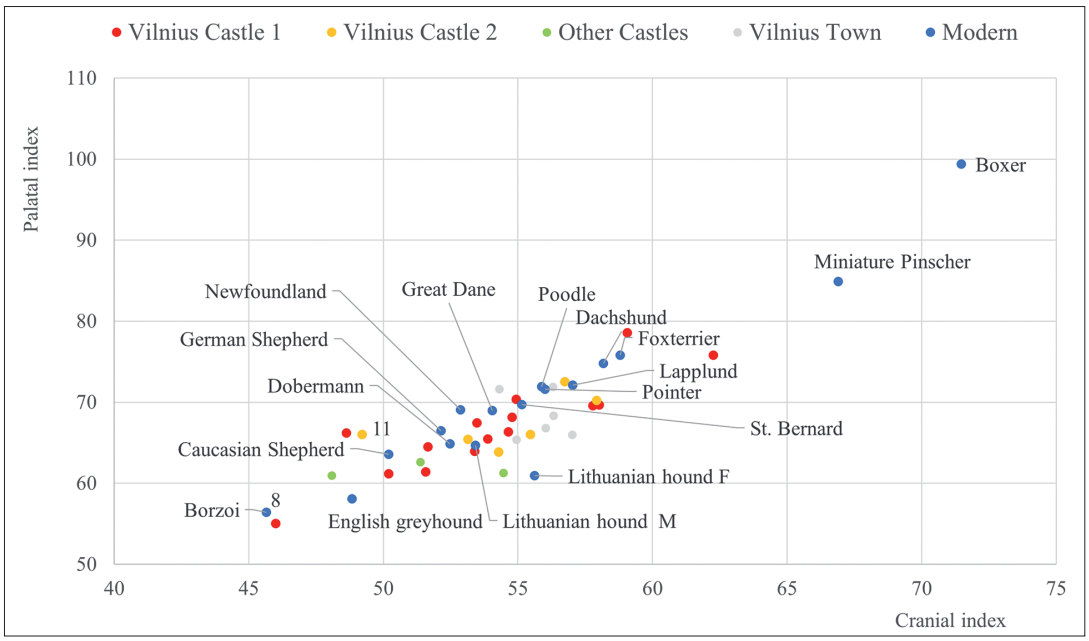

Fig. 5 Diagram comparing dogs from the sites studied (cranial index to palatal index). Vilnius Castle 1: Vilnius Lower Castle, 13th–15th centuries. – Vilnius Castle 2: Vilnius Lower Castle, 16th–17th centuries. – Other castles: Memelburg Castle (present-day Klaipėda) and Kernavė (Aukuras hillfort), 13th–14th centuries. – Vilnius town: 16th–18th centuries. – Values for current breeds after Wagner (1930) and the Osteological Collection of Vilnius University (three individuals: one Caucasian Shepherd, two Lithuanian hounds, male [M] and female [F]). – (Graphics G. Piličiauskienė).

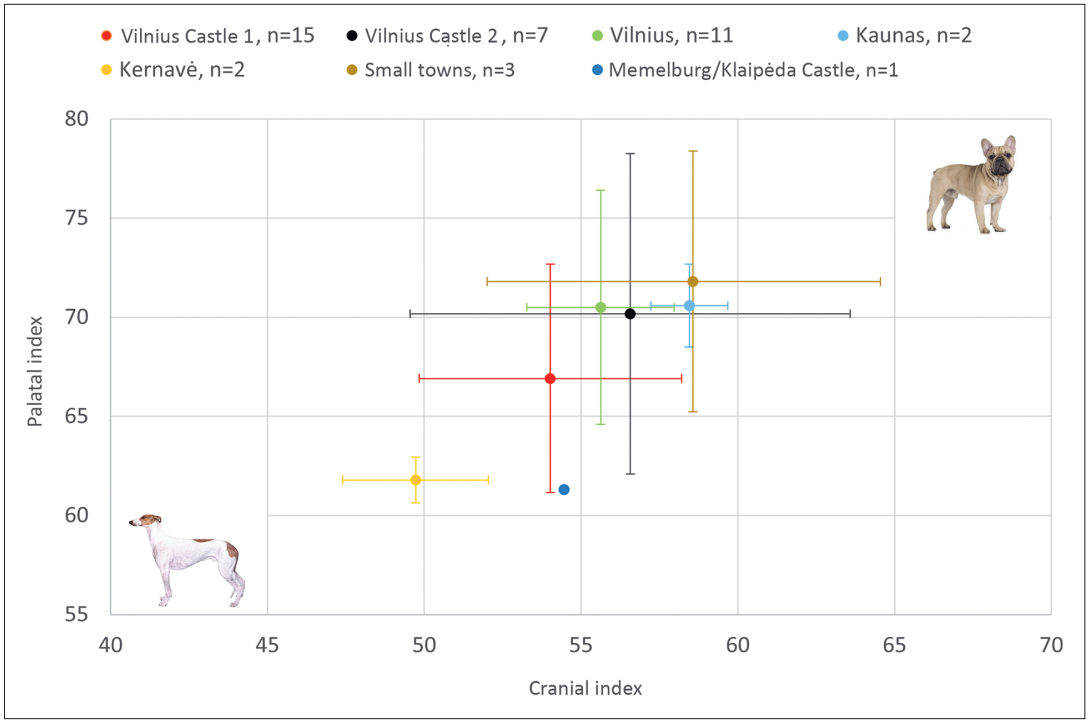

Fig. 6 Scatterplot of mean ratios of cranial and palatal indexes (bars represent mean value ± SD). Vilnius Castle 1: Vilnius Lower Castle, 13th–15th centuries. – Vilnius Castle 2: Vilnius Lower Castle, 16th–17th centuries. – Memelburg (Klaipėda) Castle (present-day Klaipėda) and Kernavė (Aukuras hillfort): 13th–14th centuries. – Vilnius, Kaunas and small towns: 16th–18th centuries. – (Graphics G. Piličiauskienė).

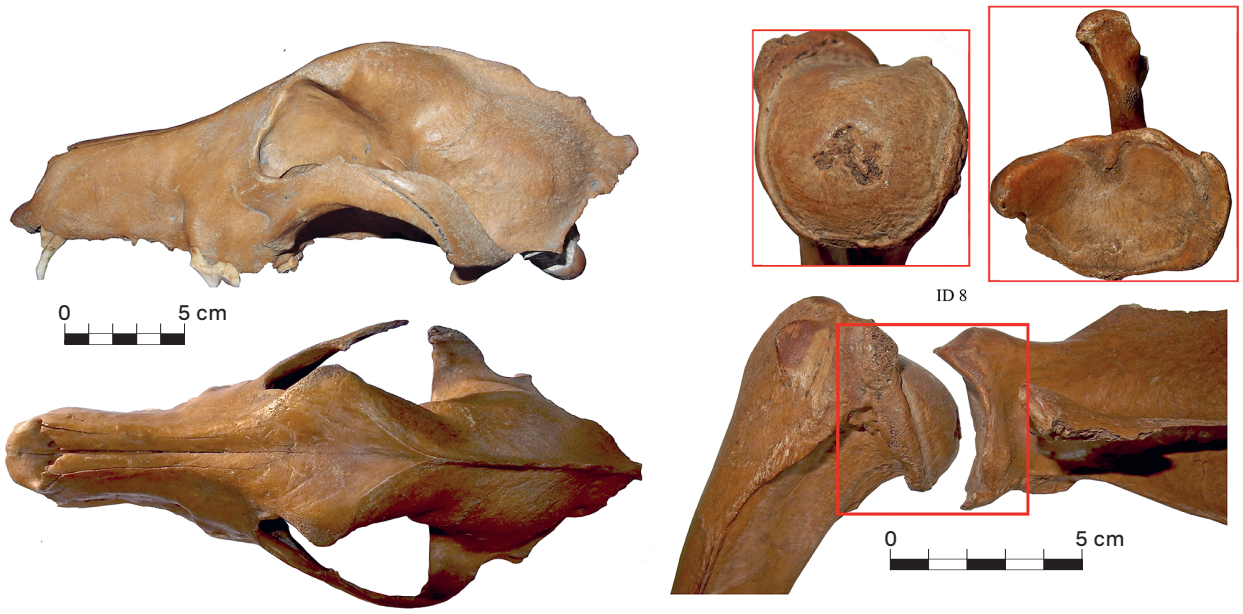

Fig. 7 Skull and shoulder joint bones of sighthound-type dog ID 8 (AD 1302–1410) from Vilnius Lower Castle. – (Photos G. Piličiauskienė).

and palatal indices (length/width ratio), almost identical to that of the Russian wolfhound (Borzoi) and highly similar to the English greyhound (**figs 5. 7**). The radii slenderness index (8.13) was close to that of the Pointer and Poodle; however, ID 8 was more than 10 cm taller than dogs of these breeds (**fig. 8**). According to the table test (Ruscillo 2006), ID 8 was most likely (85 %) a male.

This is likely to be a sighthound-type dog, a type very popular among the elite in the Middle Ages, mentioned in the three Statutes of Lithuania and represented in the iconographic material of the period discussed (Jonstonus 1650, tab. LXXI; see Piličiauskienė 2023). The dog was of adult age (all epiphyses fused), with teeth wear stage Fc. Its lower right second premolar (P_2) was lost long before death; however, all the other teeth were in very good condition. The right humerus shows signs of tendinitis, the shoulder joint (**fig. 7**) was damaged (Osteochondritis dissecans), and the dog probably limped. The dog's frontal bone bears marks of a healed trauma – slight impressions, which could have occurred after a fight with another dog or a game animal.

The $\delta^{15}N$ value (13.03 ‰) of this individual is 3.23 ‰ higher than the mean $\delta^{15}N$ value of all the castle dogs analysed (9.85 ± 1.09; n = 37) and is the highest among all the studied Lithuanian canines from the 13th to the 18th centuries (n = 81). The high $\delta^{15}N$ value probably indicates that this individual had an exceptional diet, which was rich in meat or fish (Piličiauskienė et al. 2024). The unique morphotype, diet and find context of the dog would suggest its unique status and place in the royal court. The ongoing aDNA analysis of the dog should confirm or refute the presumed relation of this individual to the sighthound-type dogs. However, even if the genetic analysis does not confirm the links between the dog and the breeds presumed, one can safely say that this was an exclusive individual due to its size, morphotype and diet; it was probably very expensive and must have belonged to an exceptional owner.

Health, Diet, and Care of Hunting Dogs: Bioarchaeological and Historical Data

The health and pathologies of the dogs found at VLC diverge from those found in large and small towns. As the preservation of the canine skeletal remains at the castle and at other sites varied due to the different taphonomy and the excavation methods, we compared only the pathologies of the complete or almost complete skulls found. In total, 21.6 % of the castle's dog skulls (n = 37) had healed trauma, which consisted mainly of fractures in the frontal, parietal and maxillary parts of the head. Meanwhile, in urban areas, 24.1 % of dogs (n = 29) had skull injuries. However, the latter animals were significantly more likely to suffer from alveolar inflammation and related tooth loss or total tooth wear (**fig. 9**). These cases were documented for 31 % of the town dogs. Among the castle canines, only a few individuals (13.5 %) had similar problems. The differences between the sites are statistically significant ($p < 0.01$).

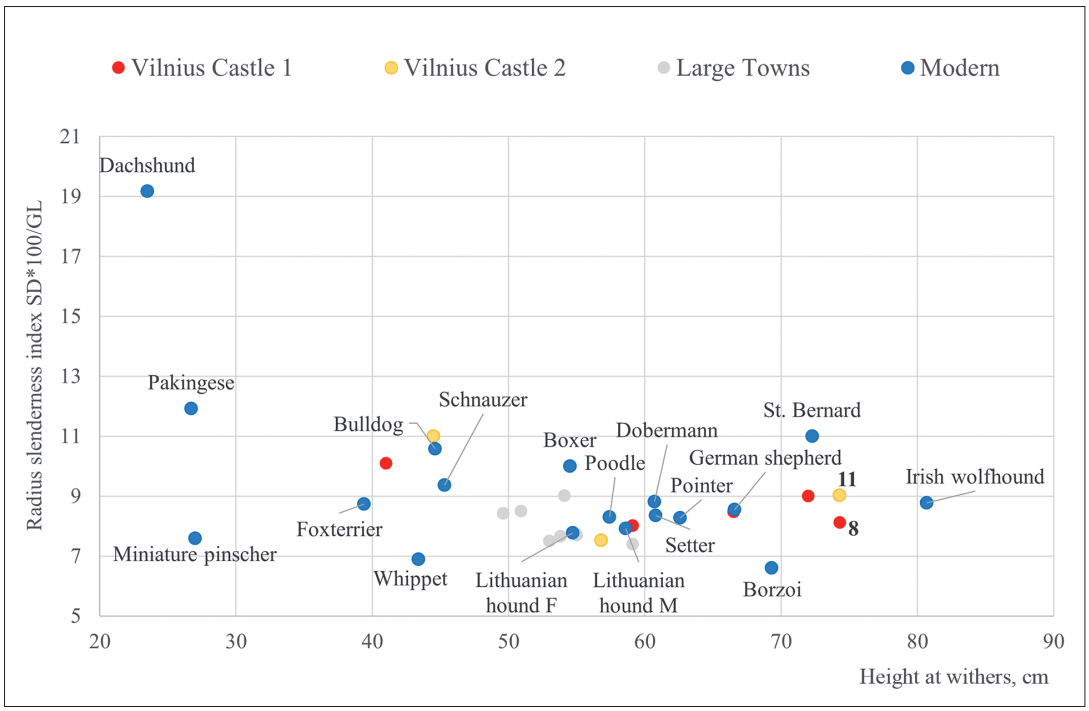

Fig. 8 Diagram comparing dogs from the sites studied (radii slenderness index to height at withers). Vilnius Castle 1: Vilnius Lower Castle, 13th to 15th centuries. – Vilnius Castle 2: Vilnius Lower Castle, 16th–17th centuries. – Large towns including Vilnius and Kaunas: 16th–18th centuries. – Values for modern breeds after Wagner (1930) and the Osteological Collection of Vilnius University (Lithuanian hounds, male [M] and female [F]). – (Graphics G. Piličiauskienė).

Fig. 9 Dog skull from Vilnius town, Reformatai square, 17th–18th centuries. The dog had a healed cranial fracture, suffered from alveolar inflammation, had lost his upper incisors, and its other teeth (premolars and molars) were heavily worn. – (Photos G. Piličiauskienė / V. Micelicaitė).

Differences in dog pathologies can be explained by the diverse social environments they lived in. Being a city or castle animal led to different care, activity and functions, and therefore different pathologies and health issues. The canines' skulls may have been frequently injured in hunting, as well as simply during dog fights. This seems to have been a common event, as dozens of individuals were kept in the nobles' kennels (Ragauskienė 2010). Meanwhile, considerably higher dental and alveolar problems in urban canines could have been caused by the very poor feeding and care of these dogs (Bartosiewicz 2008). In general, the oral health of the castle dogs was good. This is likely due to the high-quality food specially prepared for these animals daily (Ragauskienė 2010; Piličiauskienė et al. 2024).

The nutrition of hunting dogs was given a lot of attention. The manors even had special kitchens for preparing dog food (Ragauskienė 2013, 152). This is not just because canines were expensive and therefore well cared for. To work well during the long hunts, dogs had to be well fed and in excellent physical form. However, as authors of the time note, dogs must be hungry before hunting. Details of the diet and care of elite hunting dogs are provided by inventory books and other historical records. The most detailed information about dog keeping, feeding, treatment, and training comes from the fundamental work »The hunting with hounds« (original title in Polish: »Myślistwo z ogary«) by Jan Ostroróg (1618). By 1902, this highly popular book had been republished seven times.

The diet of the elite dogs was based on oat porridge. Usually fat, blood and meat waste were added, and the animals were also given a variety of meat such as lamb, pork, or poultry. Sometimes bread was also bought or specially baked for dogs. During the hunts, the dogs were given the entrails and other waste products of the game (Ostroróg 1618; Mickūnaitė 2009; Ragauskienė 2010, 37–38; Zarankaitė-Margienė 2018b). In his recommendations in »Myślistwo z ogary«, Jan Ostroróg writes that hunting dogs should only be given oats and no other cereals, especially not barley, as barley, for example, reduces a dog's sense of smell. However, the author recommends adding a little rye to the porridge to help the individual gain weight. He also notes that goat meat is particularly suitable for feeding to canines. One of Ostroróg's instructions was not to feed one's best hunting dog first, even though one would like to, because the dog must not be fat, or it will not work as efficiently as possible.

However, detailed data on dog nutrition are only available for elite animals. Historical sources do not mention how the dogs of the city dwellers were fed. Only the $\delta^{13}C$ and $\delta^{15}N$ stable isotope studies provide information on the nutrition of urban canines. They revealed differences in the diets of castle and town dogs. Somewhat unexpectedly, the mean $\delta^{15}N$ value of the Vilnius city canines (11.3 ± 0.77 ‰; n = 12) was 1.52 ‰ higher than that of the castle dogs (9.85 ± 1.09 ‰; n = 37). However, the higher nitrogen values of the urban individuals may not be due to a higher meat or fish consumption, but rather due to the high intake of faeces and animal waste (bones) in their diet, as well as to long-term starvation (Katzenberg/Lovell 1999; Bogaard et al. 2007). Constantly chewing on bones may have caused numerous dental and jaw problems. Poor nutrition and care of the dogs should not be surprising; it was caused by a variety of reasons, e. g. low standards of animal care in general, poor living conditions of town dwellers, a negative attitudes towards canines, etc. (Ragauskienė 2010; Zarankaitė-Margienė 2018a; 2018b). Scavenging dogs and pigs feeding on faeces and other waste, or sometimes even digging up bodies in cemeteries, were common in urban areas, while at the same time they served as town cleaners. This is evident in the historical records and press products from the early Modern Period and even from the early 20th century (Tourunen 2008; Kulikauskas 2018, 203).

There is no doubt that the expensive hunting dogs of the elite received better food and care than many urban canines. In the 15th and 16th centuries, the royal dogs were taken care of by some eleven to twenty dog officers. The senior dog keepers looked after animals of different functions, the lower ones trained the dogs and led them on hunts. The lowest officers prepared the food, fed and bathed the canines, and so on. The salary of the senior dog keepers was higher than that of the game-bird keepers, perhaps indicating the lesser importance of the latter (Ragauskienė 2010, 36). Strangely, however, the less drastic decrease in raptor prices in 1588 would indicate the opposite. Dog masters together with canines took part not only in hunting but also in, for example, the capturing of wild animals for the menageries, and they also trained dogs for fights with bears that were held at VLC (Ragauskienė 2010). Elite dogs were bathed, groomed, and brushed, and these services were expensive; e. g. in 1549, two *ducatus* were paid for the bathing of Sigismund Augustus' hunting dogs, which was one tenth of the annual salary of the senior dog keeper (Ragauskiene 2010, 36–37; Zarankaitė-Margienė 2018b). The most-beloved dogs were provided with velvet collars, fur coats, fox tail pads, and copper vessels. Sick animals were treated, and in some kennels there were separate rooms for suffering individuals and even a pond for the dogs to swim in (Ragauskienė 2013, 152, and references

therein). The overall living conditions and diet of the nobles' hunting dogs must therefore have been very good in the context of the period.

Dogs in Lithuania: First Historical Data

The first historical records that mention dogs in the eastern Baltic date back to the 13th century. However, the first evidence does not refer to the Lithuanians or even to the Balts, but to a Finno-Ugric tribe, the Livs, who were northern neighbours of the Balts and lived in Courland, on the eastern coast of the Baltic Sea. Heinricus de Lettis, a German chronicler and a contemporary of the events, describes that, in 1212, when attacked, the Livs threw sacrificed dogs and billy goats at the Christians to disparage them (De Lettis, *Chronicon,* ch. XVI [p. 282]). In the 14th century, Peter von Dusburg, in his »Chronicon Terrae Prussiae«, writes about the burial customs of the Prussians. The Prussians were tribes of the western Balts, who lived in the region between the lower Vistula and lower Nemunas (German: Memel, Polish: Nieman) rivers and were very closely related to the eastern Balts – the Lithuanians and Latvians. The Prussians were conquered by the Teutonic Order in the second half of the 13th century (Gimbutas 1963). The Chronicle mentions that, together with the body of a deceased nobleman/warrior, the Prussians burned his weapons, horses, slaves and maids, clothes, hunting dogs, falcons and everything necessary for his service (*Unde contingebat, quod cum nobilibus mortuis arma, equi, servi et ancille, vestes, canes venatici et aves rapaces et alia, que spectant ad miliciam, urerentur*; Dusburg, *Chronicon* 5 [p. 334]).

In 1394, Wigand von Marburg describes in the *Cronica Nova Prutenica* the same Lithuanian custom. He writes about the death and funeral of GdL Kęstutis (c. 1297–1382): »clothes, weapons etc., everything was burned, hunting birds and hunting dogs with him [the Grand Duke, author's note] reduced to ashes« (*equi, vestimenta, arma etc., omnia fuerunt incinerate, aves atque canes venatici, cum eo incinerantur*; Marburg, *Cronica*, ch. IX [p. 463]). Therefore, the earliest written records that refer to the Balts' dogs date back to the 14th century, and they directly refer to hunting dogs. Archaeological evidence and historical records that mention the burial of hunting dogs together with their owner and with his other most valuable items indicate the special importance of hunting canines in the medieval, still pagan society of the Balts.

Records about dogs increase in the late 14th to the early 15th centuries; they are mostly mentioned in the correspondence and account books of the GdL Vytautas and his cousin, the King of Poland, Jogaila. Both rulers were great hunting enthusiasts and had about 100 dogs in their kennels (Ragauskienė 2010, 24–25). In the late 14th century, King Jogaila's account books already list two specific groups of canines: hunting dogs (*canes venatici regales*) and domestic dogs (*canes domestici)*. In addition, dogs are classified according to their prey. For example, a differentiation is made between dogs for deer hunting (*canes ceruorum seu yelenie*) and dogs for bear hunting (*canes ursini alias kurcze*). The same records for the first time refer to some types or »breeds« of hunting dogs: the sighthounds (*valteres*), large sighthounds (*valteres valentes*) and »Milan« dogs (*canes Mediolanenses*), which, as noted, had exceptional strength and endurance. The last two types of canines were probably used for large game hunting. Dogs were also divided into two groups according to their role during the hunt. These were the Molossians *(mulosis canis*), which were robust animals for bear and bison hunting, for fighting, and so on, and the scenthounds (*odoriferis seu vestigialibus*; see Jaworski 2001, 51–52; Ragauskiene 2010, 25, and references therein).

Early Modern Period Hunting Dog Types and Prices: Historical Data

From the 16th century onwards, historical records of dogs are much more detailed. In 1529, the First Statute of Lithuania (Code of Laws of the GDL) provides information on the types of dogs, their functions and prices. This collection of texts mentions fifteen types of dogs used by the elite (*Pirmasis*, 288–291). The Second Statute of Lithuania, published in 1566, also mentions fifteen (*Statut*), whereas in 1588 the Third Statute of Lithuania mentions thirteen types of dogs used (*1588 metų*, 473–474). In general, the Statutes refer to two categories of canines: hunting dogs (*canes venaticos*) and domestic dogs (*latrator domesticus*). However, the latter are mentioned as a single type, while twelve to fourteen types of hunting dogs are listed. Hunting dogs are classified either according to their prey (e. g. beaver dogs, deer dogs) or according to their role during the hunt (**tab. 1; fig. 3**). In all the statutes, dogs are still classified according to the medieval concept, based on the Roman classification of canines, dividing them into hunting dogs, watchdogs and domestic dogs (Ragauskienė 2010, 24). A new classification of dogs was proposed by John Caius in 1570. In his work on British canines, he divided them into three main categories – hunting dogs, watchdogs, and »degenerates«. Hunting dogs were subdivided into game hunters, fowl hunt-

No.	Dog type	Latin and latinised names of dog types, as used in the Statutes	Dog characteristics and function	Year and dog price (*groschen*)		
				1529	1566	1588
1	Milan dog	*mediolanensis, magdalanensis*	Large, robust Molossian-type dog for bear hunting and fighting	1200	600	300
2	Bird dog?	*lyahavy, lijegavi*	Dog for elk hunting	1200	-	-
3	Beating dog	*indagatoris alias osocznyj otocznyj*	Large dog for wolf and large game hunting and beating	1200	600	300
4	Scent hound, bloodhound	*canis venaticus, canis secratoris*	Dogs for tracking large game	720	600	300
5	Hound	*canis odorisecus, venatici latratoris*		720	600	300
6	Beavers' dog	*canis castorum, castoridis*	Dog for beaver hunting	720	600	300
7	Sighthound (large)	*valter dictus kurcz, vertagus*	Robust sighthound for bear hunting? Possibly local dog type or crossbreed of local and non-local type	600	300	180
8	Sighthound for hunting with falcons	*valter subfalconario, valter falconarii*	Sighthound-type dogs for hunting in more open areas	600	600	300
9	Gun dog	*podstreici, canes liegavy?*	Bird dog, for finding and retrieving prey that had been shot	600	300	180
10	Hound (local?)	*ohar, brache seu leporaii*	Dog for game tracking, such as a scenthound	300	300	-
11	Sighthound	*valter, veltri*	Sighthound-type and function dogs	300	300	180
12	Guard dog	*latrator domesticus, domestici vulgaris*	Guard dogs	300	300	180
13	Nordic hunting dog?	*canis vzlaijnyk*	Dogs for large game hunting	180	180	180
14	Vizsla	*odori/seco ad lepores tres, ogarz minoris, wyzel*	Hungarian Vizsla, usually used for hare hunting; the Vizsla had to find and retrieve prey	180	180	120
15	Bird dog (used together with falcons)	*accipitrini, sczayka*	Bird dogs, which hunted with birds of prey	180	180	90
16	Brittany, Breton dog	*Britanici*	a) All dogs originating from Great Britain, or b) Molossian-type dogs from Brittany (France)		600	

Tab. 1 Types of dogs, their presumed function and prices, as listed in the 16th-century three Statutes of Lithuania (data after *Pirmasis*; *Statut*; *1588 metų*). – (Table G. Piličiauskienė).

ers and lapdogs. These groups were further classified according to the senses or abilities they used, such as smell, speed, and so on. Finally, animals using the sense of smell were grouped according to the prey they hunted, such as hares, deer, and others. In addition, the author gave the names of these dog breeds in Latin and English (Caii, *De canibus*, 16).

The classification of the dogs used demonstrates the great diversity of the medieval and early Modern Period canines. However, attempts to identify some of the dogs mentioned in the Statutes or in other written records more precisely and to relate them to the ancient or even modern dog breeds would be too speculative.

Yet, when linking zooarchaeological animal remains and dogs of native and other modern breeds, it should be considered that in the past, when breeding dogs, the main and most important selection criteria were their working abilities rather than their appearance (Thurston 1996; Tourunen 2008; Ragauskienė 2010). These were still the main factors when breeding hunting dogs in Lithuania even in

the late 19th century (Dmitrij V. 1876; Piličiauskienė 2023). Moreover, even though major dog morphotypes have existed since antiquity, many familiar dog breeds were only developed within the last two hundred years (Ostrander et al. 2019). Thus, the identification of and search for »breeds« based only on historical records and even osteological material without aDNA research is problematic.

As we have already mentioned, hunting dogs were very expensive. In addition, many hounds were needed for the hunts – for example, a hare hunt alone involved sometimes as many as 40 hounds, although twelve pairs of hounds, i. e. 24 dogs, were recommended in such cases (Ostroróg 1618). Thus, only very wealthy nobles were able to own large numbers of canines. At the beginning of the 14th century, the most expensive ones were the large dogs used for big game hunting and for beating (Milans, beating dogs). These dogs were of the greatest interest for the elite (Ragauskienė 2010). The most expensive dogs cost 1200 *groschen* (12 *rubles*) in 1529. This was also the price for the most expensive hunting bird at the time, the »red falcon« (*buteone ruffo*, according to the First Statute), or two work horses. Meanwhile, the most popular dogs – sighthounds, bloodhounds, and others – were much cheaper, costing 600–720 *groschen* (*Pirmasis*, 286–288).

The cheaper canines were mainly kept by the ordinary nobility. The lowest-priced ones in the early 16th century were bird dogs and Vizsla dogs, used for hunting smaller game and birds. Vizsla dogs were often described as the Hungarian Vizsla in written records; they were popular among the nobility and are often mentioned in the written records of the GDL. These canines can probably be related to an old native Hungarian bird dog called the Vizsla, a graceful, pointer-like animal, which is still widely known today. All these bird dogs were priced at 180 *groschen* (**fig. 10**). Indeed, even for the price of one of these »cheap« dogs, at the time one could have bought six cows or a peacock. However, from the middle of the 16th century, prices of dogs and hunting birds had already fallen, and by 1588 the price of many canines had more than halved. The price of the most expensive large dogs decreased the most, by up to 300 *groschen*, i. e. four times as much. Hunting birds, however, decreased less in price, and at that time were still worth twice as much as the most expensive dogs: the price of a »red falcon« in 1588 was 600 *groschen* (*1588 metų*, 469–474). This means that, at the end of the 16th century, the finest game birds were valued more highly than the best dogs, although at the beginning of the century their prices were the same.

For cheaper dogs, prices decreased less dramatically, with the prices of tracking dogs and hounds falling from 720 to 300 *groschen*. The price of various sighthounds decreseased two- to threefold, from 600 to 300–180 *groschen*, and the price of the Vizsla decreased by only 30 %, to 120 *groschen* (**fig. 10**). In addition, inflation reduced the value of canines even more. To compare, in 1588 the most expensive dog could be exchanged for just three cows, whereas in 1529 it had been worth forty! These price changes reflect the declining popularity of hunting and hunting-related goods. However, new trends were observed at that time, e. g. expensive lapdogs were becoming more popular among the elite (*Pirmasis*; *1588 metų*; see Ragauskienė 2010).

Changes in prices would suggest that the largest dogs had lost popularity among the highest elite, and that the breeding of these canines decreased. Molossians and sighthounds were presumably replaced by medium-sized dog types. This change is likely evident in the VLC dog skeleton collection, in which

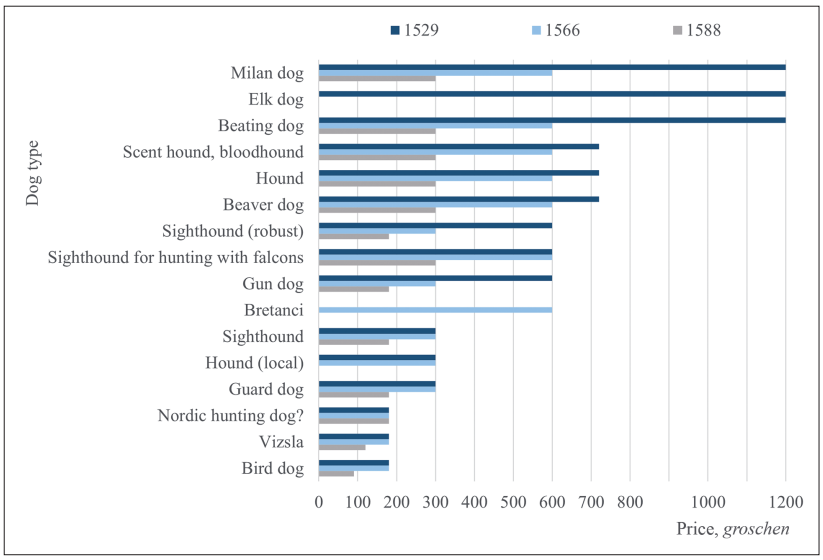

Fig. 10 Dog types and their prices, as listed in the 16th-century three Statutes of Lithuania. – Data after *Pirmasis*; *Statut*; *1588 metų*. – (Graphics G. Piličiauskienė).

large and very large-sized animals of 60–75 cm height at withers in the 16th and 17th centuries account for only 7.1 % (a single specimen, ID 11), and individuals of 40–59 cm in height, i. e. hounds and bird dog-sized animals prevailed (71.4 %). Meanwhile, in the 13th to 15th centuries, the number of large and very large-sized dogs was almost five times higher, reaching as much as 35 % (Piličiauskienė 2023). Changes in canine size, i. e. changes in the types of dogs bred, may be due to several reasons. One could be changes in the conception and idea of hunting in general. As the ideology of hunting changed, so did the actual hunting, and therefore probably also the demand for specific types of hunting dogs.

The hunting by the King of Poland and the GdL Friedrich August II (1696–1763) in Belovezh forest in 1752 illustrates that by the 18th century hunting had increasingly become just a simple slaughter of wild animals. The above-mentioned ordinary royal hunt was attended by 3,000 peasants, who drove the game into an enclosure, with a tent for the hunters in the middle of it. In this way, 42 bisons, 13 elks and many other animals were hunted and killed during this event (Mickūnaitė 2009). On another occasion, in 1759, game for the king's hunt was brought from the menagerie of the magnate Jeronimas Florianas Radvila (Hieronim Florian Radziwiłł, 1715–1760). The animals were released in an enclosure, and the king shot them while sitting in his tent. Three bears, nine elks, 25 foxes and other animals were killed this way (Ragauskienė 2013, 151, and references therein). As Mickūnaitė (2009) points out, in the Middle Ages hunting was a duel, a fight between the beast and the noble, an expression of the lord as a knight and a symbol of power. In western Europe, these »fights« between nobles and beasts ended with the extinction of large game. Meanwhile, in eastern Europe, the hunts evolved and in the early Modern Period became simply the killing of captured animals.

19th-century historical records, i. e. descriptions of hunts and hunting dogs of that time, also mention changes in the types of hunting dogs that were bred. According to these, large local types of dogs, such as the huge Irish-wolfhound-like Curonian sighthounds, the 65–81 cm tall and robust local hounds (Ogars), and some others became extinct in the 19th century in Lithuania and neighbouring regions. Moreover, it was noted that in Lithuania only a few sighthounds were left (Dmitrij V. 1876; Sabaneev 1892; Korsak 1922). Due to deforestation and hunting, wild animals in Lithuania had already declined dramatically in the 17th and 18th centuries. In the second half of the 19th century, bears and red deer became extinct, with only a limited number of wolves and elk remaining. These were the animals that large dogs were used to hunt. So, with the extinction of large game, there was no longer any need for large hunting canines. Large dogs – sighthounds, Molossian-type hounds and others – were replaced by middle-sized hounds, pointers and setters, which were used to hunt birds, hares and other smaller game (Dmitrij V. 1876; Sabaneev 1892; Korsak 1922). The change in dog types has also been noted in the zooarchaeological material (see **fig. 6**). Hunters of the time saw changes in dog types and the extinction of the old »breeds« in a very simple and pragmatic way: some breeds disappeared since they were no longer needed, and a demand for new and different ones occurred (Starinnyā 1876, 64).

The Origin of Elite Hunting Dogs: Historical Data

Hunting dogs were bred locally, bought abroad, or given as gifts, and sometimes arrived in Lithuania with new inhabitants. Presumably, the Tatars who settled in Lithuania at the end of the 14th century brought coarse-haired sighthounds with them (Isokas 1981, 58). An interesting fact was mentioned by R. Ragauskienė (2010), who analysed the origin of hunting dogs in the GDL: she did not find any data on the selling or buying of dogs by monarchs or nobles in the territory of the GDL, as hunting dogs were presented as gifts. Such a gift was a sign of kindness or appreciation. The earliest records of dogs being presented date back to the end of the 14th and the beginning of the 15th century, when GdL Vytautas was gifted with horses, weapons, hunting dogs, hunting birds and other items (Čapaitė 2001). From the 15th century at least, the GdL and the King of Poland regularly exchanged dogs with various western European monarchs (Jaworski 2001). For example, Emperor Maximilian II (1527–1576) sent dogs referred to as »Bretons« and »hounds« to Sigismund II Augustus. The latter exchanged dogs with his cousin, the Prince of Prussia, Albrecht von Brandenburg-Ansbach (1490–1568) (*Rachunki*, 212; see Ragauskienė 2010, 35, and references therein).

Hunting dogs were presented not only to men, but also to women; for example, Duke Kristupas Radvila Perkūnas (Polish: Krzysztof Radziwiłł Piorun, 1547–1603), one of the most famous noblemen of the GDL, sent at least a few dogs to his wife-to-be in 1581 (Fabiani 1988, 15; Ragauskienė 2010, 35). Meanwhile, ordinary noblemen obtained dogs not only by giving them as gifts, but also by borrowing them, selling them, sometimes stealing them, or simply capturing the animals they liked (*Kasdienis*; Ragauskienė 2010, 35; Zarankaitė-Margienė 2018b).

In Lithuania, even in the second half of the 19th century, there was a deep-rooted tradition of gifting dogs rather than selling them, going back to the Middle Ages and even earlier. As a hunter writes in a hunting journal in 1876: »You can't sell a puppy, you can't ask for money, it's not proper, it's not accepted from the old days. You can only give it as a gift« (Dmitrij V. 1876, 18). According to 19th-century records, a common hunting dog changed its owner three to four times during its life – usually animals were presented as a gift, and later regifted (Dmitrij V. 1876).

Apart from the ones they received as gifts or which were bred locally, the GdL and the richest nobles of the state bought good »pedigree« dogs abroad – in Italy, England, Spain, Poland, Prussia and other countries. For example, in 1582, a royal envoy travelling to the Queen of England had to buy puppies, »Brittanys« or »Bretons« (Pokora 2006, 14). The GdL and King of Poland, Stephen Báthory (1533–1586), received dogs from England, Hungary, and Italy, while Vladislaus Vasa (1595–1648) obtained animals from Brandenburg and England (Ragauskienė 2013, 151, and references therein).

Thus, hunting dogs arrived at the kennels of the GDL elite from all over Europe. However, dogs of non-local origin were likely to be found only in the hunts of the highest elite. Nobles of the middle and lower classes usually kept locally-bred canines.

Conclusions

Archaeological and historical sources suggest that dogs, along with horses and hunting birds, were common companions of the deceased and had already played an exceptionally important role in the society of the Balts before the Christianisation of Lithuania in 1387. The earliest historical records for hunting dogs suggest that these animals were the most highly valued. Although hunting remained the most important function of the dog in the early Modern Period, the decreasing price of hunting dogs from the middle of the 16th century onwards may reflect the declining importance of the hunting dog as a status symbol.

The first attempts to describe and classify elite hunting dogs in the Grand Duchy of Lithuania can be found in written records from the late 14th to early 15th centuries. Records became much more detailed in the 16th century, when twelve to fourteen types of hunting dog were listed. Traditionally, dogs have been classified according to their role in the hunt and the animals they hunted. However, misleading and brief descriptions of dog types often do not allow a more precise identification of the morphotypes of the dogs mentioned. In the early Modern Period, the breeding of dogs was still based on the working abilities of an animal, not its phenotype. These criteria for dog selection remained valid throughout the 19th century.

Still, a few dog types, such as sighthounds and Molossians, can be more accurately identified among the dog types mentioned. Although sighthounds were cheaper than Molossians, they were among the earliest and most frequently mentioned hunting dogs in the historical records, which suggests their exceptional popularity and importance in the Grand Duchy of Lithuania during the Middle Ages. Numerous remains of tall, gracile built, dolichocephalic dogs found in the 13th–15th-century layers at Vilnius Lower Castle and a few other elite related sites would support such an assumption. Prices for sighthounds, as for many hunting dogs, declined considerably during the 16th century, and the remains of this tall and gracile dog type become absent in more recent zooarchaeological material, suggesting the decreasing popularity of the sighthound-type dogs, at least among the highest elite. Records of hunting and hunting dogs from the 19th century confirm that sighthounds were only very rarely bred and used for hunting in Lithuania at that time.

The exceptional size and morphotype of some individuals, the wide diversity, and the exceptionally good oral health status of the dogs from Vilnius Lower Castle would suggest that these dogs represent the elite's environment and activities and may be related to the types of hunting dogs mentioned in the historical records. However, only DNA analysis may confirm or reject hypotheses and relate the dogs found at the Royal Castle to native or non-local breeds of hunting dogs still being bred today.

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Bibliography

Sources

Caii, *De canibus*: Ioannis Caii, De canibus Britannicis, liber unus. In: Iohannis Caii, De rariorum animalium et stirpium historia liber unus. De libris propriis liber unus (Londinium 1570) 1–21.

De Lettis, *Chronicon*: Henricus de Lettis, Chronicon Livonicum vetus 1225–1227. In: Baltų religijos ir mitologijos šaltiniai. Nuo seniausių laikų iki XV amžiaus pabaigos. Ed. N. Vėlius (Vilnius 1996) 275–292.

Długosz, *Historia*: Jan Długosz (Dlugossius), Historia Polonica. In: Baltų religijos ir mitologijos šaltiniai. Nuo seniausių laikų iki XV amžiaus pabaigos. Ed. N. Vėlius (Vilnius 1996) 542–585.

Dusburg, *Chronicon*: Peter von Dusburg, Chronicon Terrae Prussiae 1326. In: Baltų religijos ir mitologijos šaltiniai. Nuo seniausių laikų iki XV amžiaus pabaigos. Ed. N. Vėlius (Vilnius 1996) 327–355.

Kasdienis: Kasdienis gyvenimas Lietuvos Didžiojoje Kunigaikštystėje. Ed. A. Baliulis / E. Meilus (Vilnius 2001).

Lietuvos Metrika: Lietuvos Metrika, Kn. 8 (1499–1514). Eds A. Baliulis / R. Firkovičius / D. Antanavičius (Vilnius 1995).

Marburg, *Cronica*: Wigand von Marburg, Cronica Nova Prutenica 1394. In: Baltų religijos ir mitologijos šaltiniai. Nuo seniausių laikų iki XV amžiaus pabaigos. Ed. N. Vėlius (Vilnius 1996) 455–470.

Pirmasis: Pirmasis Lietuvos Statutas (1529), t. d.1. Tekstai senqja baltarusiap, lotynų ir senqja lenkų kalbomis (Vilnius 1991).

Rachunki: Rachunki dworu krolewskiego 1544–1567. Ed. A. Chmiel (Kraków 1911).

Statut: Statut Litewski drugiej redakcyi (1566). Archiwum komisyi prawniczej, t. 7 (Kraków 1900).

1588 metų: 1588 metų Lietuvos Statutas. T. 2: Tekstas. Ed. I. Lappo (Kaunas 1938).

References

Almond 2003: R. Almond, Medieval hunting (Stroud 2003).

Bartosiewicz 2008: L. Bartosiewicz, Environmental stress in early domestic sheep. In: Z. Miklikova / R. Thomas (eds), Current Research in Animal Palaeopathology: Proceedings of the Second ICAZ Animal Palaeopathology Working Group Conference. BAR Internat. Ser. 1844 (Oxford 2008) 3–13.

Baublienė et al. 2003: J. Baublienė / L. Daugnora / R. Trainienė / D. Vaičiūnienė /S. Veličkaitė, XIV a. sodyboje (Viršutinis Kernavės miestas) iškastos osteologinės medžiagos analizė. Lietuvos Arch. 26, 2003, 163–168.

Belhaoues 2011: F. Belhaoues, Etude d'un assemblage canin inèdit issu du puits 203 à Ambrussum (Hérault) [Master's thesis, Univ. Montpellier III – Paul Valéry 2011].

Bertašius 2002: M. Bertašius, Vidurio Lietuva VIII–XII a. (Kaunas 2002).

2009: M. Bertašius, Marvelė 2. Ein Bestattungsplatz mit Pferdegräbern (Kaunas 2009).

Bogaard et al. 2007: A. Bogaard / T. H. E. Heaton / P. Poulton / I. Merbach, The impact of manuring on nitrogen isotope ratios in cereals: Archaeological implications for reconstruction of diet and crop management practices. Journal Arch. Scien. 34, 2007, 335–343.

Čapaitė 2001: R. Čapaitė, Lietuvos didžiojo kunigaikščio Vytauto kasdienybė pagal jo ir amžininkų korespondenciją. Alytaus miesto istorijos fragmentai 2001, 10–27.

Daugnora/Girininkas 1996: L. Daugnora / A. Girininkas, Osteoarcheologija Lietuvoje (Vilnius 1996).

De Grossi Mazzorin/Tagliacozzo 2000: J. De Grossi Mazzorin / A. Tagliacozzo, Morphological and osteological changes in the dog from the Neolithic to the Roman Period in Italy. In: S. J. Crockford (ed.), Dogs Through Time: An Archaeological Perspective. BAR Internat. Ser. 889 (Oxford 2000) 141–161.

Dmitrij V. 1876: Dmitrij V., Замѣтки объ охотѣ въ Ковенской губ. (окончаніе). Журналъ охоты 4, T. V, 1876, 16–31.

Von den Driesch 1976: A. von den Driesch, A guide to the measurement of animal bones from archaeological sites. Peaboby Mus. Bull. 1 (Massachusetts 1976).

Ehrlich et al. 2020: F. Ehrlich / G. Piličiauskienė / M. Ubė-Urbonaitė / E. Rannamäe, The Meaning of Eagles in the Baltic Region. A Case Study from the Castle of the Teutonic Order in Klaipėda, Lithuania (13th–14th Century). Arch. Lituana 21, 2020, 59–78.

Fabiani 1988: B. Fabiani, Na dworze Wazow w Warszawie (Warszawa 1988).

Gimbutas 1963: M. Gimbutas, The Balts (London 1963).

Harcourt 1974: R. Harcourt, The dog in prehistoric and early historic Britain. Journal Arch. Scien. 1, 1974, 151–175.

Horard-Herbin 2000: M. P. Horard-Herbin, Dog management and use in the late Iron Age: the evidence from the Gallic site of Levroux (France). In: S. J. Crockford (ed.), Dogs Through Time: An Archaeological Perspective. BAR Internat. Ser. 889 (Oxford 2000) 115–121.

Hourani 2018: Y. Hourani, Persian Period dog burials of Beirut: morphology, health, mortality and mortuary practices. In: C. Çarkırlar / J. Chahoud / R. Berthon / S. P. Birch (eds), Archaeozoology of the Near East XII: Proceedings of the 12th International Symposium of the ICAZ Archaeozoology of Southwest Asia and Adjacent Areas Working Group, Groningen Institute of Archaeology, June 14–15, 2015, University of Groningen, the Netherlands (Groningen 2018) 153–184.

Isokas 1981: G. Isokas, Gaudžia ragas. Žvėrys, paukščiai ir jų medžioklė Lietuvoje (Vilnius 1981).

Jaworski 2001: R. Jaworski, Łowy Władysława Jagiełły. Z biografistyki Polski poźnego średniowiecza. In: M. Koczerskiej (ed.), Fasciculi Historici Novi IV (Warszawa 2001) 7–86.

Jonstonus 1650: J. Jonstonus, Historiae naturalis de quadrupedibus libri cum aeneis figuris (Francofurti ad Moenum 1650).

Katzenberg/Lovell 1999: M. A. Katzenberg / N. C. Lovell, Stable isotope variation in pathological bone. Internat. Journal Osteoarch. 5, 1999, 316–324.

Korsak 1922: W. Korsak, Rok myśliwego rzecz dla myśliwych i miłośników przyrody (Poznań 1922).

Kręt 1981: H. Kręt, Dwór królewski Jadwigi i Jagiełły (Kraków 1981).

Kulikauskas 2018: G. Kulikauskas, Lietuvio kodas (Vilnius 2018).

Luik et al. 2022: H. Luik / G. Piličiauskienė / V. Podėnas / V. Micelicaitė / K. Minkevičius / A. Čivilytė, Animal bones, bone artefacts and bone working at Late Bronze Age fortified settlements in north-eastern Lithuania: Sokiškiai, Mineikiškės and Garniai I. Arch. Lituana 23, 2022, 237–268.

Makowiecki 2006: D. Makowiecki, Remarks on the »Breeds« of Dog (*Canis lupus f. familiaris*) in the Polish Lowland in the Roman Period, the Middle Ages and Post-Medieval Times in the Light of Archaeozoological Research. Fasciculi Arch. Hist. 8, 2006, 63–73.

Manning 1993: R. B. Manning, Hunters and Poachers. A Cultural and Social History of Unlawful Hunting in England 1485–1640 (Oxford 1993).

Micelicaitė et al. 2023: V. Micelicaitė / G. Piličiauskienė / V. Podėnas / K. Minkevičius / A. Damušytė, Subsistence and diet of the first fortified settlement communities in Lithuania: zooarchaeological analysis of Late Bronze Age assemblages from Garniai 1 and Mineikiškės. Heritage 6(1), 2023, 333–350.

Mickūnaitė 2009: G. Mickūnaitė, Didžiojo kunigaikščio medžioklė: pasakojimas, vaizdas, alegorijos. Acta Acad. Art. Vilnensis 55, 2009, 7–22.

Nichols 2021: Ch. Nichols, Domestic dog skeletons at Valsgärde cemetery, Uppland, Sweden: Quantification and morphological reconstruction. Journal Arch. Scien.: Reports 36. DOI:10.1016/j.jasrep.2021.102875.

Öhman 1983: I. Öhmann, The Merovingian dogs from the boat-graves at Vendel. In: J. P. Lamm / H.-A. Nordström (eds), Vendel Period Studies. Transactions of the Boat-grave symposium in Stockholm, February 23, 1981 (Stockholm 1983) 167–182.

Ostrander et al. 2019: E. A. Ostrander / G.-D. Wang / G. Larson / B. M. VonHoldt / B. W. Davis / V. Jagannathan / Ch. Hitte / R. K. Wayne / Y.-P. Zhang, Dog 10K: an international sequencing effort to advance studies of canine domestication, phenotypes and health. Nat. Scien. Rev. 6(4), 2019, 810–824.

Ostroróg 1618: J. Ostroróg, Myślistwo z ogary Iana hrabie z Ostroroga, woiewody poznanskiego (Krakow 1618).

Petrauskas 2003: R. Petrauskas, Vytauto dvaras: struktūra ir kasdienybė. Naujasis Židinys-Aidai 1/2, 2003, 39–44.

Piličiauskas et al. 2017: G. Piličiauskas / D. Kisielienė / G. Piličiauskienė, Deconstructing the concept of Subneolithic farming in the southeastern Baltic. Vegetation Hist. and Archaeobotany 26(2), 2017, 183–193.

2019: G. Piličiauskas / D. Kisielienė / G. Piličiauskienė / L. Gaižauskas / A. Kalinauskas, Comb Ware culture in Lithuania: new evidence from Šventoji 43. Lietuvos Arch. 45, 2019, 67–103.

Piličiauskienė 2023: G. Piličiauskienė, Šunys zooarcheologiniais duomenimis. In: Šunys Lietuvoje XIII–XVIII a. (Vilnius 2023) 65–191.

Piličiauskienė/Blaževičius 2018: G. Piličiauskienė / P. Blaževičius, Žinduoliai Vilniaus pilyse. In: Vilniaus pilių fauna: nuo kepsnio iki draugo (Vilnius 2018) 19–101.

Piličiauskienė et al. 2024: G. Piličiauskienė / R. Skipitytė / P. Blaževičius / V. Micelicaitė, Dogs in Lithuania from

the 12th to 18th C AD: diet and health according to stable isotope, zooarchaeological, and historical data. Animals 14(7), 2024, 1023. DOI: 10.3390/ani14071023.

Pokora 2006: J. Pokora, Psy, błazny, dzieci, krolowie ... Studia nad sztuką XV–XVIII wieku (Warszawa 2006).

Prummel 1992: W. Prummel, Early medieval dog burials among the Germanic tribes. Helinium XXXII (1–2), 1992, 132–194.

Ragauskienė 2010: R. Ragauskienė, Šunys Lietuvos Didžiosios Kunigaikštystės valdovų dvaruose (XIII a. vidurys – pirmoji XVII a. pusė). Lietuvos pilys 6, 2010, 164–177.

2013: R. Ragauskienė, Из «истории животных»: собаки при дворе правителей Великого Княжества Литовского (до середины XVII века). In: СОЦІУМ. Альманах соціальної історії 10 (Kiiv 2013) 144–160.

Ruscillo 2006: D. Ruscillo, The Table Test: a Simple Technique for Sexing Canid Humeri. In: D. Ruscillo (ed.), Recent Advances in Ageing and Sexing Animal Bones (Oxford 2006) 62–67.

Sabaneev 1892: L. P. Sabaneev, Охотничий календарь. Справочная книга для ружейныхъ и псовых охотниковъ (Moskva 1892).

Samsonowicz 2011: A. Samsonowicz, Łowiectwo w Polsce Piastów i Jagiellonów (Warszawa 2011).

Silver 1969: I. A. Silver, The ageing of domestic animals. In: D. Brothwell / E. Higgs (eds), Science in archaeology: a survey of progress and research (London 1969) 283–302.

Sykes 2018: B. Sykes, The Wolf Within: A Genetic History of Man's Best Friend (London 2018).

Smetona et al. 2021: M. Smetona / M. Milinavičius / A. Smetonienė, Lietuvių skalikai (Vilnius 2021).

Starinnyā 1876: Старинныя породы собакъ. Журналъ охоты 1, T. IV, 1876, 64.

Sten 2013: S. Sten, Sacrificed animals in Swedish Late Iron Age monumental mound burials. In: G. Ekroth / J. Wallensten (eds), Bones, Behaviour and Belief. The Zooarchaeological Evidence as a Source for Ritual Practice in Ancient Greece and Beyond (Athens 2013) 223–231.

Svetikas 1982: E. Svetikas, Bazorų senkapio (Alytaus raj.) 1981 metų tyrinėjimų ataskaita [excavations report, Lithuanian Institute of History, Vilnius, file 926, 1982].

Thurston 1996: M. Thurston, The Lost History of the Canine Race. Our 15,000-Year Love Affair with Dogs (Kansas City 1996).

Tourunen 2008: A. Tourunen, Animals in an Urban Context. A Zooarchaeological Study of the Medieval and Post-Medieval Town of Turku [PhD thesis, Univ. Turku 2008).

Urbanavičius 1980: V. Urbanavičius, Obelių senkapis, Ukmergės raj. (1978 ir 1979 m. kasinėjimų ataskaita [excavations report, Lithuanian Institute of History, Vilnius, file 994 1980].

Varnas 1994: A. Varnas, Masteikių kapinyno 1993 metų tyrimai. In: Archeologiniai tyrinėjimai Lietuvoje 1992 ir 1993 metai (Vilnius 1994) 178–184.

1996: A. Varnas, Masteikių kapinyno (Kauno r.) tyrimai 1994 metais. In: Archeologiniai tyrinėjimai Lietuvoje 1994 ir 1995 metais (Vilnius 1996) 77–78.

Wagner 1930: K. Wagner, Rezente Hunderassen. Eine osteologische Untersuchung. Skr. Norske Videnskabelige Akad. I. Mat.-Naturvidensk. Kl. 9 (Oslo 1930).

Zarankaitė-Margienė 2018a: T. Zarankaitė-Margienė, Laukiniai žvėrys Lietuvos Didžiosios Kunigaikštystės valdovo aplinkoje XIV–XVII amžiuje. In: Vilniaus pilių fauna (Vilnius 2018) 245–273.

2018b: T. Zarankaitė-Margienė, Medžioklės fenomenas Lietuvos Didžiojoje kunigaikštystėje XV–XVI a. (1572 m.): socioekonominis, sociopolitinis, mentalinis aspektai [PhD thesis, Univ. Vilnius 2018].

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Zooarchaeological and Historical Data on Wild Birds and Falconry from the 13th to 17th Centuries in Lithuania

ABSTRACT

In general, bird bones form a small part of zooarchaeological material from any given period. Although written sources indicate that the hunting of wild birds was a rather visible leisure pursuit and that domestic birds formed a significant part of the nobles' diet in the 13th to 17th centuries in the territory of modern Lithuania, there are very few zooarchaeological studies supporting this. The aim of this study is to add to what we know so far about game birds and falconry in Lithuania based on bird bone material from two sites: Kernavė town and castle and Vilnius Lower Castle. A total minimum number of individuals of 1323 assigned to ten orders were examined, and at least six species of birds of prey have been identified from both sites. This paper presents new zooarchaeological data, radiocarbon dating results and bone collagen $\delta^{13}C$ and $\delta^{15}N$ stable isotope measurements and adds further archaeological and historical materials before arriving at a conclusion.

KEYWORDS

Falconry / taphonomy / avian remains / Lithuania / medieval / Early Modern Period

Bird Remains in Lithuania

Bird bones are found at every late Mesolithic to early Subneolithic site (6th–4th millennia BC) in Lithuania where faunal remains have been preserved, e. g. at Garnys, Šventoji 43, Kretuonas 1C, 1D and others (Piličiauskas et al. 2019; 2023; see also Daugnora/Girininkas 2004). The first domesticated mammals appeared in Lithuania only around 2900–2600 cal BC (Piličiauskas et al. 2017). Early evidence of predatory birds – an unspecified northern goshawk bone (*Accipiter gentilis*) and a white-tailed eagle phalanx (*Haliaeetus albicilla*) – came to light at the Šventoji Subneolithic sites (c. 3000 cal BC) in coastal Lithuania. A phalanx and a tarsometatarsus from a white-tailed eagle (*Haliaeetus albicilla*) were found at the Subneolithic/early Bronze age sites Kretuonas 1C and Žemaitiškė 2 in eastern Lithuania (Bilskienė/Daugnora 2000; Daugnora/Girininkas 2012).

The first attempt to discuss hunting with birds of prey in general in the territory of modern Lithuania was made in 2012, when elaborated zooarchaeological and historical analyses were carried out, based on zooarchaeological, archaeological and palynological data from the Middle Ages (Blaževičius et al. 2012). Bird bones and falconry equipment from the 13th to 16th centuries were analyzed within a historical context, with the result that, overall, birds of prey from the Middle Ages (13th century to second half of 15th century) and later times have so far been identified at three Lithuanian sites: Kernavė upper town and castle (Bilskienė/Daugnora 2000; Daugnora et al. 2002), Klaipėda castle (Ehrlich et al. 2020) and Vilnius Lower Castle (Blaževičius et al. 2012; Rumbutis et al. 2018; Ehrlich et al. 2022).

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Fig. 1 Map of Lithuania with sites mentioned in the text. – (Map A. Zagurskytė).

Falconry in general can be described as the taking of quarry in its natural state and habitat by means of trained birds of prey (definition according to The International Association for Falconry and Conservation of Birds of Prey [IAF]; www.iaf.org). According to modern-day falconers (description in the following after Richter 2018), hawking utilises the natural behaviour of the bird. Sparrowhawks, goshawks and peregrines are used in central Europe, and usually the females are preferred because they are bigger than the males. Goshawks are short distance hunters, usually flown from the fist, and they hunt rabbits on the ground as well as birds in the air, such as partridges, ducks, pheasants, and crows. Falcons are mostly used in open landscape, for example in so-called waiting-on falconry. The bird is released into the air and when it is in a good, high position, it waits for the game to be flushed out by a dog and then swoops at high speed down on the birds beneath it, which are the same species as are taken by the aforementioned goshawk.

Goshawks were an important bird species in the Baltic region and were commonly used here for falconry in the past. Falcons were also used for the same purpose, but much more rarely. During the period in question (13th–17th centuries), the territory of the Grand Duchy of Lithuania was favourable for the use of goshawks due to densely forested lands (Makowiecki 2009, 438).

This paper deals with data from the 13th–17th centuries from key sites in Lithuania: Vilnius Lower Castle and Kernavė town and castle (**fig. 1**). New zooarchaeological data will be presented to complement previous publications from both sites. Direct AMS dating and stable isotope $\delta^{13}C$ and $\delta^{15}N$ analyses on birds of prey from Vilnius Lower Castle were also performed for this study. Previous analysis of remains from Klaipėda Castle in Lithuania will be mentioned for comparison (Ehrlich et al. 2020). The main subject of this article is falconry in Lithuania in the 13th–17th centuries and what evidence is available for its occurence.

Material and Methods

Zooarchaeological Analysis

The bird bones from Kernavė (upper and lower) town and castle (NISP: 297, MNI: 45) were hand-collected during the excavations of 1987–2001 (**tab. 1**; see Vėlius 2019). The rest of the material was retrieved by sieving during the excavations conducted in 2021 (NISP: 193, MNI: 29; Vėlius 2019; 2022). This study discusses bird bones from the Middle Ages only, therefore bones from earlier periods were not taken into account here. The whole collection is well-preserved and mainly consists of complete bones or large fragments.

The bird bones from Vilnius Lower Castle were collected during the excavations of 1988–2020 (**tab. 1**). The paper presented here includes bird bones from the 13th–17th centuries, therefore those from earlier and later periods of this site were not included. Part of the material was gathered by hand during the 1987–2018 excavations (NISP: 1253, MNI: 446) and analysed and identified by Saulius Rumbutis (Rumbutis et al. 2018). The rest of the material from the excavations of 2019 and 2020 was retrieved by sieving (NISP: 1095, MNI: 803) and analysed and identified by Aurelija Zagurskytė with the help and supervision of Hanneke J. M. Meijer during a visit to Bergen University (Norway). The material is well-preserved and consists mainly of whole bones or large fragments. The material from Vilnius Lower Castle discussed in this article was chronologically divided into three periods: 13th century to middle of 14th century, late 14th to early 16th century, and 16th to 17th centuries. This chronological classification continues throughout the text (with dating of two bird bones revised according to AMS results; see **tab. 6**).

Taxonomical identification was achieved by morphological comparison with large collections of modern bird skeletons at Kaunas Tadas Ivanauskas Museum of Zoology (Lithuania) and the University of Bergen (Norway). Manuals by von den Driesch (1976), Serjeantson (2009) and a case study by Poland 2018 (see also references therein) were also used. The recording included: bone element, side, zones present, fusion, sex when identification was possible, and bone surface modifications. All identified and unidentified bones were assigned to size classes. Size categories used for recording in this study were assigned by Aurelija Zagurskytė (**tab. 2**). In this way it was possible to include all bird bone fragments in the record and then to demonstrate that small birds, which could not be identified to species, as well as large birds were present (Serjeantson 2009, 81–83; Harrison/Steward 1999).

Site	Vilnius Lower Castle		Kernavė, upper town and castle		
Years of excavation and method applied	1988-2018 hand collected	2019-2020 sieved	upper town, 1986-2001, hand collected	castle, 1997-2018 hand collected	castle, 2022 sieved
Excavation area	20,000 m²	~22 m²	~18,000 m²		36 m²

Tab. 1 General information on excavation methods and areas at Vilnius Lower Castle (after Blaževičius 2018; 2022) and Kernavė (after Vėlius 2019; 2022).

Size classes	Species defining the class	Body length (cm)	Weight (kg)
Extra small/XS	Passerines	<30	<0.23
Small/S	*Columba livia; Perdix perdix*	29-37	0.24-0.5
Medium/M	*Tetrao tetrix; Anas platyrhynchos*	38-73	1.1-1.25
Large/L	*Tetrao urogallus; Anser anser*	74-125	3.6-6.7
Huge/H	*Grus grus; Cygnus cygnus; Meleagris gallopavo*	126-275	5.1-14

Tab. 2 Size categories for recording bird bones, established by A. Zagurskytė.

$\delta^{13}C$ and $\delta^{15}N$ Analyses and AMS Dating

Radiocarbon dating and stable isotope $\delta^{13}C$ and $\delta^{15}N$ measurements were carried out at the Centre for Physical Sciences and Technology, Vilnius (Lithuania). An accelerator mass spectrometer (SSAMS, NEC, USA) and automated graphitization system AGE 3 (IonPlus AG) were used for analysis. Collagen extraction from bones was applied with the acid-alkaline-acid (AAA) procedure, followed by collagen extraction (Szidat et al. 2017). Base materials IAEA C3, OXII, IAEA C9 were used. Conventional ^{14}C dates were calibrated with the OxCal 4.4.4 software, the IntCal20 curve (Reimer et al. 2020). All the ^{14}C dates are reported within the 95.4 % (2σ) confidence interval. Bone collagen extraction for stable isotope $\delta^{13}C$ and $\delta^{15}N$ measurements was successfully performed on seven raptor bones (five from northern goshawks, two from golden eagles) and one chicken bone from Vilnius Lower Castle (see **tab. 6**). All samples had sufficient collagen yields (≥ 1 %), and atomic C:N ratios were between 3.20 and 3.35, indicating good preservation according to the empirical study by DeNiro (1985). All samples had elemental concentrations above the range of ≥30 % for C and ≥11 % for N, as defined by G. J. van Klinken (1999).

Description of Sites

Kernavė Town

The town of Kernavė is situated in the eastern part of modern Lithuania (**fig. 1**). In the second half of the 13th century, a castle – Aukuras hillfort – existed, together with a town surrounding it, with characteristic defensive installations and street layout. Zooarchaeological and other findings dating from the end of the 13th and the first half of the 14th century reflect the prosperity of Kernavė lower town and castle (Vėlius 2005, 10). However, the year 1390 turned out to be baneful for city and castle when a large army of the Teutonic Order and its allies approached. City defenders set fire to the castle and the forts and withdrew. After that, the castle was never rebuilt, and even though the city itself did not burn down, it was abandoned by its residents in the 14th century (Vėlius 2005; Vitkūnas 2006; Kuncevičius et al. 2019). Over time, the area was covered with sediments and layers of soil. Under the peat, at high groundwater levels, organic material was very well preserved. The entire complex of archaeological monuments in Kernavė remained almost undamaged in later times. Kernavė town and castle (**fig. 2**) were excavated between 1986 and 2022 (Vaičiūnienė 2000; 2001; 2002; Vėlius 2019; 2022).

Vilnius Lower Castle

In Vilnius, the existence of a castle and town in the territory of the Vilnius Lower Castle complex can be confirmed from the second half of the 13th century. Three different stages can be distinguished in the history of the castle complex: the first period starts at the beginning of the 13th century and lasts until the middle of the 14th century, indicating a brick-walled castle surrounded by wooden constructions. The second phase starts at the end of the 14th century and lasts until the beginning of the 16th century, reflecting the use of the site as the residence of the Grand Dukes in a period of prosperity, when constant constructions and reconstructions of the castle led to the rapid formation of large cultural layers. The third period lasted from the second part of the 16th century until the 17th century, when the complex functioned as a royal residence. The castle was transformed into a palace and its defensive function disappeared. Wooden buildings used by craftsmen, merchants and courtiers were replaced by new brick buildings, and log-built streets and roads were paved with stones. This period is also characterized by dramatic changes in the middle of the 17th century, after the city had been plundered, pillaged and burned down by the Muscovite army. In the year 1655 and onwards, most of the buildings were destroyed and abandoned, and they were not rebuild. After this war (Russo-Polish War of 1654–1667), the castle complex was no longer repaired and used as a residence, and from the 18th century just townspeople and poor nobles settled here. The complex was finally destroyed at the turn from the 18th to the 19th century. The humid environment, uneven terrain and constant reconstructions of the castle and surrounding city led to the formation of rich cultural layers of up to eight meters (Blaževičius et al. 2012). Vilnius Lower Castle territory was excavated over more than three decades (**fig. 3**), between 1987 and 2020 (Rackevičius 2009, 165–167; Blaževičius 2018, 10–17).

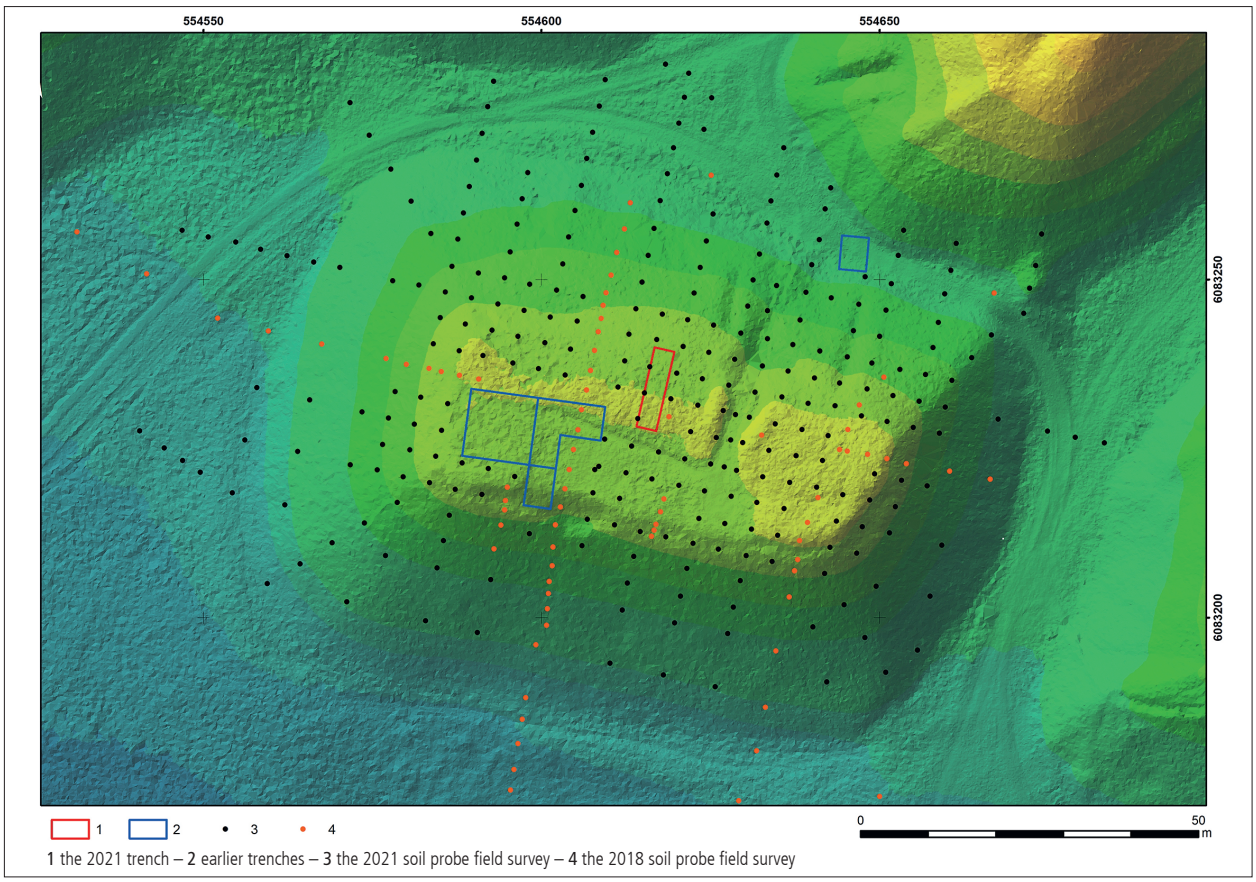

Fig. 2 Excavation areas at Kernavė town and hillfort. – (After Vėlius et al. 2021).

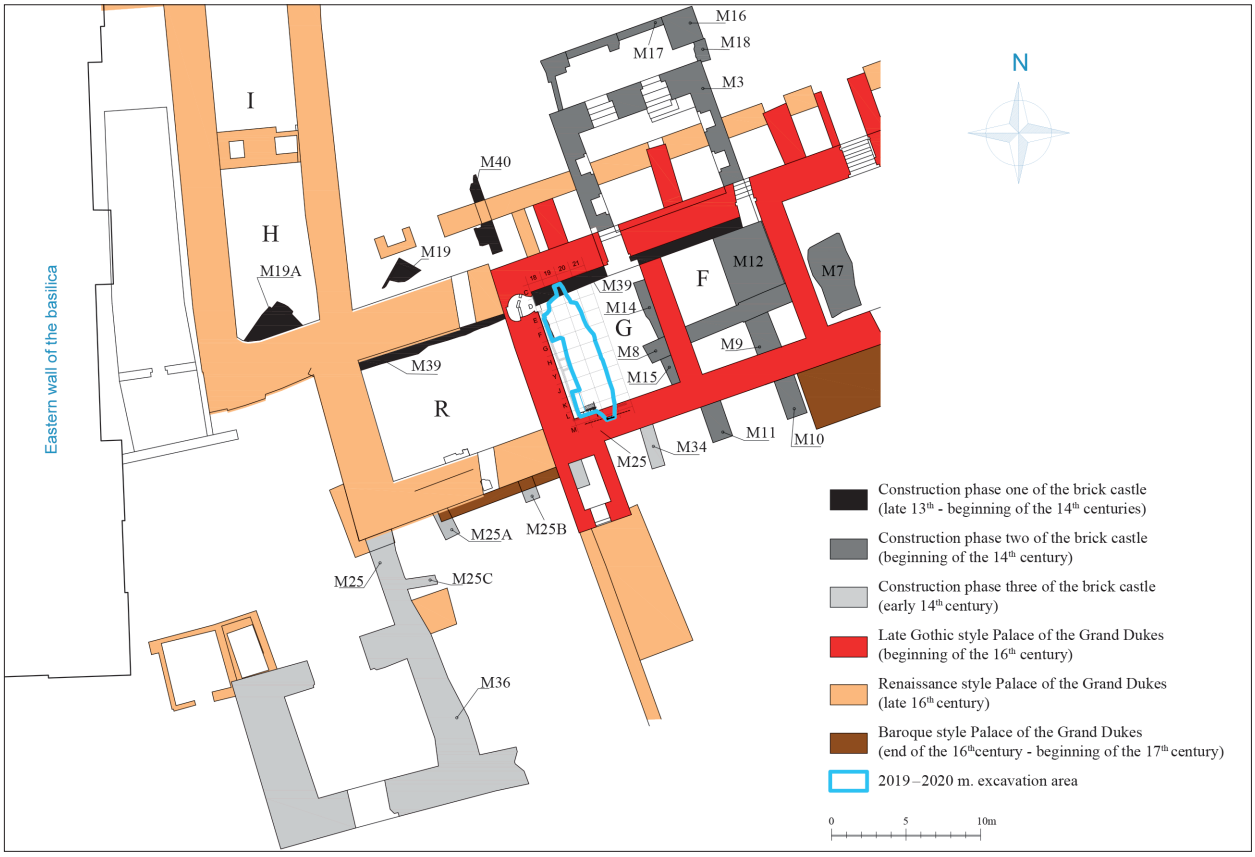

Fig. 3 Excavation area at Vilnius Lower Castle. – (Map R. Račinskas, after Blaževičius 2022).

Results and Discussion

Overview of Birds in Kernavė Town and Castle

In total, 490 specimens were collected in the territory of Kernavė town (upper and lower) and castle. Identified bones (80.6 %, NISP: 395, MNI: 74) were assigned to eight families from eight orders (**fig. 4**) and at least 24 species of birds (**tab. 3**). The most abundant ones are the domestic and wild species of the Phasianidae bird family (70.61 %, NISP: 346). In comparison, the second-largest family present is that of the Anatinae (4.29 %, NISP: 21), while the remaining six avian families consist of only a few specimens each in this material. It is worth mentioning that the Corvidae family (2.86 %, NISP: 14) is also fairly well-represented.

Remains of birds of prey (six wing bones, two leg bones) from the territory of Kernavė town and castle were assigned to at least three species of the Accipitridae family (2.0 %, NISP: 8). Even though only disarticulated bones were present, neither of them had visible marks that could indicate the extraction of feathers. However, plucking feathers from birds does not necessarily leave marks on bones. Feathers are attached to the skin, and when plucked, they usually come off with the skin and follicle intact. In some circumstances, especially if plucking is done carelessly or aggressively, the skin can be damaged, potentially leading to abrasion or injury to the underlying tissue (Serjeantson 2009). The distal part of a tarsometatarsus belonged to a juvenile golden/white-tailed eagle (**tab. 5**).

In terms of bird sizes, medium ones prevailed (89.37 %, NISP: 353), while the amount of large (6.08 %, NISP: 24), small (3.29 %, NISP: 13), and extra small (1.01 %, NISP: 4) birds was limited. Only one fragment (0.25 %) of mute swan was assigned to the »huge bird« category (**fig. 5**). Concerning game birds, 18 species of all sizes of birds were present at the site (**tab. 3**), with medium-sized ones dominating. Only a few of the bones had marks of human activity: a pintail/mallard clavicula and a goose sternum had cut marks, whereas one black grouse humerus was split transversely, which might suggest the disarticulation of the birds for meat (Serjeantson 2009).

Kernavė Castle (13th/14th centuries)

At least 15 species of birds were identified in the territory of the castle (**tab. 3**). Only three species were waterfowl: goose (3.8 %, NISP: 15), ducks (1.4 %, NISP: 5) and mute swan (0.3 %, NISP 1). The largest part of the collection, at least twelve species, were land fowl. Most of these were domestic (NISP: 195) and wild (NISP: 24) species of the Phasianidae family (86.9 %). It is worth mentioning that the second-largest family collected in the territory of the castle, the Corvidae (4.0 %, NISP: 10), consists of five different species (western jackdaw, common raven, hooded crow, spotted nutcracker, Eurasian magpie), while the rest of the land birds (2.8 %, NISP: 7) belonged to five different families. Three specimens of predatory birds were collected: one northern goshawk carpometacarpus, one (juvenile) golden/white-tailed eagle tarsometatarsus and one (male) white-tailed eagle humerus (**tab. 5**).

Kernavė Town (13th/14th centuries)

At least 16 species of birds were identified in the territory of the town (**tab. 3**). Four species belonged to waterfowl: goose (1.4 %, NISP: 2), duck (1.4 %, NISP: 2), mute swan (0.7 %, NISP: 1) and ruddy turnstone (0.7 %, NISP: 1). However, as expected, the largest part, at least eleven species, were land fowl. Most of them, as in the castle territory, were domestic (NISP: 103) and wild (NISP: 24) species of the Phasianidae family (88.8 %), while at least two species of birds of prey were present: three (female) white-tailed eagle bones and two merlin/kestrel bones.

Overview of Birds at Vilnius Lower Castle

In total, 2348 specimens were collected in the area of Vilnius Lower Castle. Identified bones (79.6 %, NISP: 1869, MNI: 1249) were assigned to 18 families from ten orders (**tab. 4**) and at least 46 species. The largest number of identified bones belong to the domestic and wild birds of the Phasianidae family (72.5 %, NISP: 1355). The Anatinae (20.97 %, NISP: 392) are the second-largest family on-site. In comparison, the remaining 16 families together represent just over 6 % of all identified bird specimens (**tab. 4; fig. 6**).

At least 42 species of game birds have been identified at Vilnius Lower Castle (**tab. 4**). The majority of the bones are from waterfowl (17.5 %, NISP: 412), while land fowl represent less than half of the game birds (9.2 %, NISP: 216). Waterfowl game birds belong to at least 14 species, with the most abundant ones being geese (12.9 %, NISP: 304) and ducks (2.7 %, NISP: 64). As for land game birds, most of them belong to the Phasianidae family (5.9 %, NISP: 139). It is worth noting that birds of the Corvidae family were

Taxon	Castle			Town			Total		
	NISP	%	MNI	NISP	%	MNI	NISP	%	MNI
Mute swan (*Cygnus cygnus*)	-	-	-	1	0.7	1	1	0.3	1
Greylag/bean goose (*Anser anser/fabalis*)	12	4.8	1	2	1.4	1	14	3.5	2
Barnacle goose (*Branta leucopsis*)	1	0.4	1	-	-	-	1	0.3	1
Mallard (*Anas platyrhynchos*)	-	-	-	1	0.7	1	1	0.3	1
Long-tailed duck (*Clangula hyemalis)*	1	0.4	1	-	-	-	1	0.3	1
Ducks (Anatinae)	2	0.8	1	-	-	-	2	0.5	1
Diving ducks (*Aythya*)	-	-	-	1	0.7	1	1	0.3	1
Golden/white-tailed eagle (*Aquila chrysaetos/Haliaeetus albicilla*)	-	-	-	1	0.7	1	1	0.3	1
Northern goshawk (*Accipiter gentilis*)	-	-	-	1	0.7	1	1	0.3	1
White-tailed eagle (*Haliaeetus albicilla*)	3	1.2	1	1	0.7	1	4	1.0	2
Merlin/kestrel (*Falco columbarius/tinnunculus*)	2	0.8	2	-	-	-	2	0.5	2
Tawny owl (*Strix aluco*)	-		-	1	0.7	1	1	0.3	1
Western jackdaw (*Coloeus monedula*)	1	0.4	1	1	0.7	1	2	0.5	2
Common raven (*Corvus corax*)	7	2.8	-	1	0.7	1	8	2.0	1
Hooded crow (*Corvus cornix*)	1	0.4	1	-	-	-	1	0.3	1
Domestic chicken (*Gallus gallus var domesticus*)	195	77.4	27	103	72.0	11	298	75.4	38
Phasianidae	16	6.3	4	15	10.5	1	31	7.8	5
Grouse (Tetraonidae)	-	-	-	2	1.4	1	2	0.5	1
Black grouse (*Tetrao tetrix*)	-	-	-	4	2.8	1	4	1.0	1
Western capercaillie(*Tetrao urogallus*)	2	0.8	1	3	2.1	1	5	1.3	2
Hazel grouse (*Bonasa bonasia*)	3	1.2	2	-	-	-	3	0.8	2
Willow ptarmigan (*Lagopus lagopus*)	1	0.4	1	-	-	-	1	0.3	1
Rock ptarmigan (*Lagopus mutus*)	2	0.8	2	-	-	-	2	0.5	2
Ruddy turnstone (*Arenaria interpres*)	-	-	-	1	0.7	1	1	0.3	1
Spotted nutcracker (*Nucifraga caryocatactes*)	-	-	-	1	0.7	1	1	0.3	1
Eurasian magpie (*Pica pica*)	1	0.4	1	1	0.7	1	2	0.5	2
Rock dove (*Columba livia*)	1	0.4	1	-	-	-	1	0.3	1
Rock/stock dove (*Columba livia/oenas*)	1	0.4	1	-	-	-	1	0.3	1
Water rail/corn crake (*Rallus aquaticus/crex crex*)	-	-	-	2	1.4	1	2	0.5	1
Total NISP/MNI	252	84.8	45	143	74.1	29	395	80.6	74
Indetermined	45	15.2	-	50	25.9	-	95	19.4	-
Total	**297**	**100**	**45**	**193**	**100**	**29**	**490**	**100**	**74**

Tab. 3 Distribution of bird taxa from Kernavė town and castle dated to the 13th/14th centuries. – NISP = number of identified specimens; MNI = minimum number of individuals. – (Table A. Zagurskytė).

Taxon	13th to middle of 14th century			Late 14th to early 16th century			Middle of 16th to 17th century			Total		
	NISP	%	MNI	NISP	%	MNI	NISP	%	MNI	NISP	%	MNI
White/black stork (*Ciconia ciconia/ nigra*)	1	0.1	1	2	0.4	2	6	1.2	1	9	0.5	4
Mute/whooper swan (*Cygnus olor/cygnus*)	1	0.1	1	8	1.4	7	2	0.4	2	11	0.6	10
Geese (*Anser* sp.)	4	0.5	4	142	25.7	63	136	26.5	50	282	15.1	117
Greylag/bean goose *(Anser anser/fabalis*)	22	2.7	22	-	-	-	-	-	-	22	1.2	22
Ducks (Anatinae)	18	2.2	18	23	4.2	13	4	0.8	4	45	2.4	35
Northern pintail (*Anas acuta*)	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Mallard (*Anas platyrhynchos*)	9	1.1	9	-	-	-	-	-	-	9	0.5	9
Common shelduck (*Tadorna tadorna*)	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Eurasian teal/garganey (*Anas crecca/querquedula*)	4	0.5	4	-	-	-	-	-	-	4	0.2	4
Diving ducks (*Aythya* sp.)	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Common goldeneye (*Bucephala clangula*)	4	0.5	4	5	0.9	4	2	0.4	2	11	0.6	10
Common scoter (*Melanitta nigra*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Red-breasted merganser (*Mergus serrator*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Razorbill (*Alca torda*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Northern goshawk (*Accipiter gentilis*)	-	-	-	7	1.3	5	-	-	-	7	0.4	5
Eurasian sparrowhawk (*Accipiter nisus*)	3	0.4	3	-	-	-	2	0.4	1	5	0.3	4
Golden eagle (*Aquila chrysaetos*)	-	-	-	1	0.2	1	1	0.2	1	2	0.1	2
Peregrine falcon (*Falco peregrinus*)	-	-	-	1	0.2	1	-	-	-	1	0.1	1
Kestrel (*Falco tinnunculus*)	5	0.6	5	-	-	-	-	-	-	5	0.3	5
Merlin/kestrel (*Falco columbarius/tinnunculus*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Hazel grouse (*Bonasa bonasia*)	11	1.4	11	1	0.2	1	1	0.2	1	13	0.7	13
Grey partridge (*Perdix perdix*)	2	0.2	2	1	0.2	1	3	0.6	2	6	0.3	5
Willow ptarmigan (*Lagopus lagopus*)	4	0.5	4	1	0.2	1	-	-	-	5	0.3	5
Black grouse (*Tetrao tetrix*)	33	4.1	33	10	1.8	7	11	2.1	6	54	2.9	46
Western capercaillie (*Tetrao urogallus*)	16	2.0	16	3	0.5	3	5	1.0	4	24	1.3	23
Chicken (*Gallus gallus var domesticus*)	502	62.5	55	326	59.0	145	314	61.2	90	662	35.4	257
Common pheasant (*Phasianus colchicus*)	2	0.2	2	6	1.1	5	1	0.2	1	9	0.5	8
Phasianidae	74	9.2	8	-	-	-	-	-	-	554	29.6	53
Indian peafowl (*Pavo cristatus*)	-	-	-	5	0.9	3	-	-	-	5	0.3	3

Taxon	13th to middle of 14th century			Late 14th to early 16th century			Middle of 16th to 17th century			Total		
	NISP	%	MNI	NISP	%	MNI	NISP	%	MNI	NISP	%	MNI
Turkey (*Meleagris gallopavo*)	-	-	-	5	0.9	3	16	3.1	4	21	1.1	7
Turkey/peafowl (*Meleagris gallopavo/Pavo cristatus*)	-	-	-	1	0.2	1	1	0.2	1	2	0.1	2
Common crane (*Grus grus*)	1	0.1	1	1	0.2	1	1	0.2	1	3	0.2	3
Corn crake (*Crex crex*)	4	0.5	4	-	-	-	-	-	-	4	0.2	4
Water rail (*Rallus aquaticus*)	5	0.6	5	-	-	-	-	-	-	5	0.3	5
Rail (Rallidae)	3	0.4	3	-	-	-	-	-	-	3	0.2	3
Sandpiper (Scolopacidae)	2	0.2	2	-	-	-	1	0.2	1	3	0.2	3
Northern lapwing (*Vanellus vanellus*)	3	0.4	3	2	0.4	1	-	-	-	5	0.3	4
Charadriiformes	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Motacillidae	4	0.5	4	-	-	-	-	-	-	4	0.2	4
Rock dove (*Columba livia*)	5	0.6	5	-	-	-	-	-	-	5	0.3	5
Stock dove (*Columba oenas*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Stock/rock dove (*Columba oenas/livia*)	-	-	-	1	0.2	1	-	-	-	1	0.1	1
Common wood pigeon (*Columba palumbus*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Fieldfare (*Turdus pilaris*)	-	-	-	-	-	-	1	0.2	1	1	0.1	1
True trushes (*Turdus* sp.)	5	0.6	5	-	-	-	-	-	-	5	0.3	5
Bunting (Emberizidae)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Eurasian golden oriole (*Oriolus oriolus*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Passeriformes	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Western jackdaw (*Coloeus monedula*)	1	0.1	1	-	-	-	4	0.8	2	1	0.1	3
Common raven (*Corvus corax*)	16	2.0	16	1	0.2	1	-	-	-	17	0.9	17
Hooded crow (*Corvus cornix*)	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Rook (*Corvus frugilegus*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Crow (*Corvus* sp.)	2	0.2	2	-	-	-	-	-	-	2	0.1	2
Spotted nutcracker (*Nucifraga caryocatactes*)	1	0.1	1	-	-	-	-	-	-	1	0.1	1
Eurasian magpie (*Pica pica*)	7	0.9	7	-	-	-	1	0.2	1	8	0.4	8
True owls (Strigidae)	9	1.1	9	-	-	-	-	-	-	9	0.5	9
Total NISP/MNI	803	73.3	803	553	83.5	270	513	86.8	176	1869	79.6	1249
Indetermined	292	26.7	-	109	16.5	-	78	13.2	-	479	20.4	-
Total	**1095**	**100.0**	**803**	**662**	**100.0**	**270**	**591**	**100.0**	**176**	**2348**	**100.0**	**1249**

Tab. 4 Distribution of bird bone taxa from Vilnius Lower Castle dated to the 13th to 17th centuries. – NISP = number of identified specimens; MNI = minimum number of individuals. – (Table A. Zagurskytė).

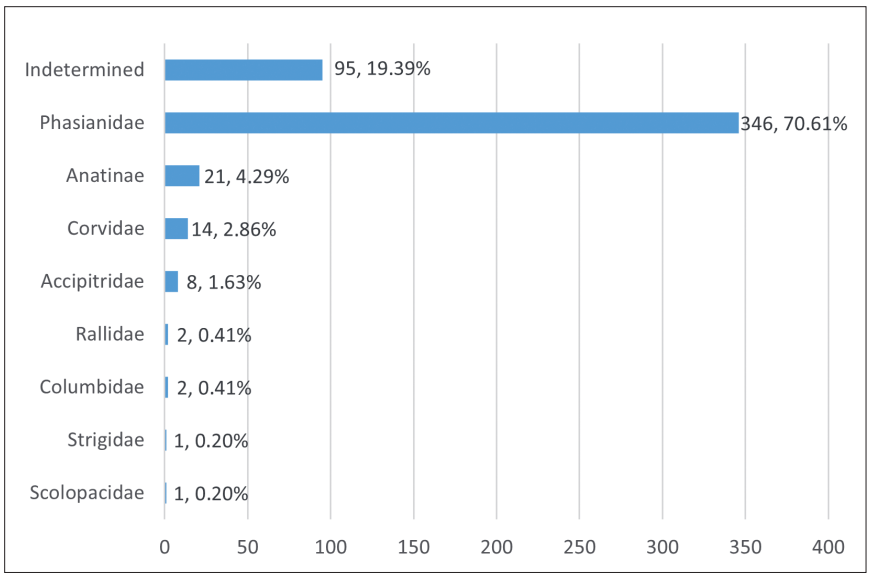

Fig. 4 Families of birds identified in Kernavė town dated from the 13th/14th centuries. Numbers behind bars indicate NISP = number of identified specimens.

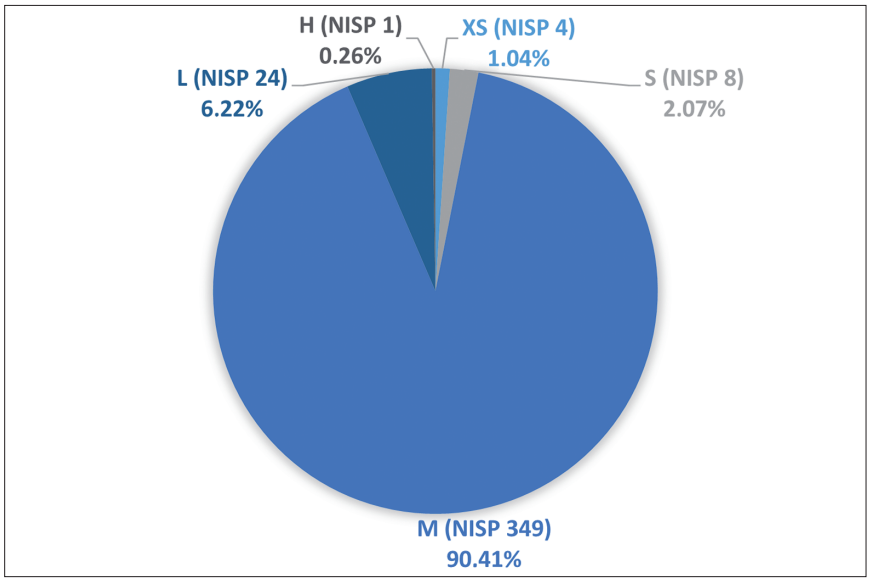

Fig. 5 Distribution of bird sizes from Kernavė town, 13th/14th centuries. XS: extra small; S: small; M: medium; L: large; H: huge. – NISP = number of identified specimens.

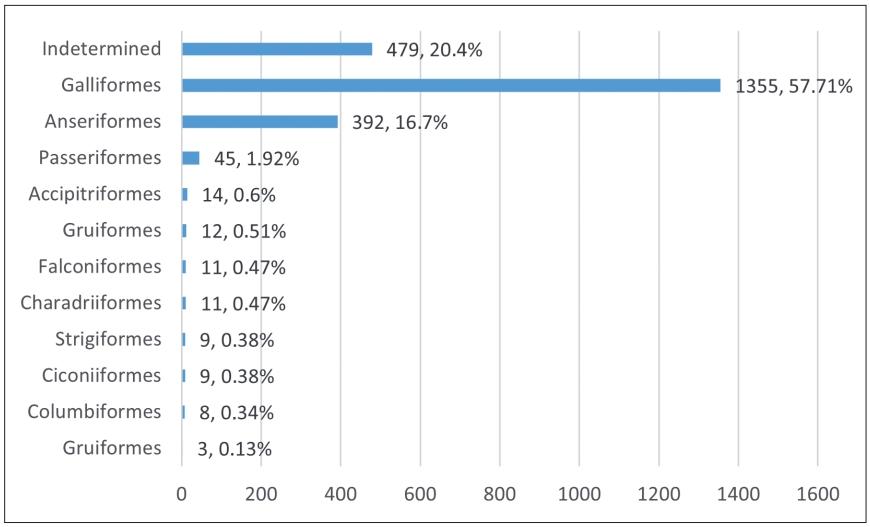

Fig. 6 Orders of birds identified at Vilnius Lower Castle, 13th to 17th centuries. Numbers behind bars indicate NISP = number of identified specimens.

a relatively large proportion of all identified game birds (1.3 %, NISP: 32). Many of the game bird bones have chopping, cutting and gnawing marks. Cases of splitting also present on long leg and wing bones are indicative of the birds being used for meat (Serjeantson 2009). In terms of size, medium-sized birds completely dominate (74.05 %, NISP: 1384), whereas large birds (18.41 %, NISP: 344) represent the second-largest group. All remaining sizes of birds are fairly evenly distributed (**tab. 4**).

At least five different species of birds of prey were identified (1.34 %, NISP: 25) from different Vilnius Lower Castle periods: northern goshawk, Eurasian sparrowhawk, golden eagle, peregrine falcon and kestrel/merlin. A total of 21 northern goshawk bones from all parts of the body and one almost entire skeleton have been identified. The northern goshawk was most common in the material, but sparrowhawk and kestrel bones were also frequent (**tab. 5**).

Vilnius Lower Castle before Christianization (13th Century – Middle of 14th Century)

The bird bone collection from this period is the most abundant one (46.6 %, NISP: 1095) from this site, because sieving was applied during the excavations. The majority of the identified specimens were assigned to the category of chicken (62.5 %, NISP: 502) and wild species of the Phasianidae family (in total 80.1 %): hazel grouse, grey partridge, willow ptarmigan, black grouse and western capercaillie, while ducks (5.4 %, NISP: 43) and geese (3.2 %, NISP: 26) were much less common. It is worth mentioning that birds of the Corvidae family (western jackdaw, common raven, hooded crow, rook, spotted nutcracker) were also high in number (2.7 %, NISP: 23) in this phase, which is not noticeable in later periods. This is, most likely, due to sieving being implemented during the excavations of the layers of this period. The amount of small (6.1 %, NISP: 49) and extra small (3.5 %, NISP: 28) birds in this period is also substantial. Large (6.4 %, NISP: 51) and huge (0.3 %, NISP: 3) ones from this period are less common, while medium-sized birds are the most abundant ones (83.7 %, NISP: 672; **fig. 7**).

Residence of the Grand Duke (Late 14th Century to early 16th Century)

Bird bones from this period account for 28.2 % of all specimens (NISP: 662), and all material was collected by hand. The largest family of birds recorded for this period is that of the Phasianidae (64.9 %, NISP: 359), with the most abundant species being the chicken (59 %, NISP: 326). Additionally, a few Indian peafowl and turkey bones appear in this period. Wild Phasianidae species, namely hazel grouse, willow ptarmigan, black grouse, western capercailie, grey partridge and common pheasant, are less abundant (4.0 %, NISP: 22) than in the earlier period. A considerably larger number of geese (25.7 %, NISP: 142) have been identified, while ducks (5.1 %, NISP: 28) are less abundant. In terms of size, hazel grouse (NISP: 1), grey partridge (NISP: 1) and northern lapwing (NISP: 2) are the only small birds from this period, whereas none of the identified bones were classified as extra small, which is most likely due to the hand-collection method applied.

Royal Palace (Mid-16th Century to 17th Century)

The last period accounts for 25.2 % of all specimens (NISP: 591), with the material being collected by hand. Chickens (61.2 %, NISP: 314) and other species of the Phasianidae family form the largest part of the identified bones (in total 68.6 %, NISP: 353). Overall, the distribution of chickens and the wild species of the Phasianidae family is similar to that of the earlier period, with a significantly higher amount of turkey bones (3.1 %, NISP: 16) present (**tab. 4**). A large number of geese (26.5 %, NISP: 136) and only few ducks (1.2 %, NISP: 6) were identified. In terms of size, small (2.1 %, NISP: 11) and extra small (0.2 %, NISP: 1) birds are present. However, the largest groups are medium (64.7 %, NISP: 332) large (27.7 %, NISP: 142) and huge (5.1 %, NISP: 26) birds.

$\delta^{13}C$ and $\delta^{15}N$ Analysis and AMS dating of Birds from Vilnius Lower Castle

Results of isotopic analyses (**tab. 6; fig. 8**) show that northern goshawk from this site had a mean $\delta^{13}C$ value of -20.72 ‰, ranging from -21.44 ‰ to -19.95 ‰, and golden eagle had a mean $\delta^{13}C$ value of -20.73 ‰, ranging from -20.53 ‰ to -20.93 ‰. The mean $\delta^{15}N$ value for northern goshawk was 8.98 ‰, ranging from 7.74 ‰ to 10.23 ‰, and golden eagle had a mean $\delta^{15}N$ value of 8.63 ‰, ranging from 7.22 ‰ to 10.05 ‰.

The lowest nitrogen values for predators are 7.22–7.74 ‰, which are even lower than those for chickens, and are close to values for herbivores and omnivores, but not for predators with a meat-based diet, or at least dogs with an omnivorous diet in general (**figs 8-9**). Moreover, the difference between the highest and lowest nitrogen values for both species of analysed birds of prey is quite large, reaching 2.83 ‰. If the two specimens with the lowest $\delta^{15}N$ values are excluded, the mean $\delta^{15}N$ values of the

remaining individuals are very similar, averaging 9.4 ‰ and differing by only 1.41 ‰. Without a more extensive and detailed study of raptor diets, it will be difficult to provide a reasonable explanation for such differences. It may be assumed that the unexpectedly low nitrogen values of a few individuals are related to an error in species identification or by a very different diet of these birds, related to exceptional living conditions. However, a more detailed study is needed to support this hypothesis. Perhaps such low values are indeed the norm in the diet of birds of prey.

All in all, five specimens of predatory birds and a rooster were taken for C/N carbon stable isotope analysis to reveal the diet of these birds. All carbon isotope values of birds lie between 19.95 ‰ to 27.10 ‰ and the nitrogen values between 5 ‰ to 10.80 ‰.

Two birds of prey – a specimen from a northern goshawk skeleton and a fragment from a golden eagle's sternum – were also sampled for radiocarbon AMS ^{14}C dating. These (**tab. 6**) had previously been assigned to the late 14th to early 16th centuries; however, the goshawk according to AMS ^{14}C dating can be dated more precisely to cal AD 1265–1384 and the golden eagle to cal AD 1300–1401.

Further Archaeological and Historical Information

Northern goshawk bones were the most abundant bird of prey bones found at Vilnius Lower Castle (**tab. 5**). All seven goshawk bones were collected from the layer previously dated to the late 14th to the early 16th century (0.4 %, NISP: 7), three of which belonged to female goshawks, two to male, while two could not be identified to sex. The finds of Eurasian sparrowhawk (0.3 %, NISP: 5) date to between the 13th and the middle of the 14th century in the earliest phase of the castle (**tab. 5**). Regarding the sex of the identified birds, only one bone was identified as being that of a female, while the others could not be determined. Two specimens of golden eagle (0.1 %, NISP: 2) were previously dated to two different periods: the late 14th to the early 16th, and the middle of the 16th to the 17th century. Both of them are from

Taxon	NISP		MNI	Sex	Juveniles
	NISP total	NISP %			
Kernavė town (13th-14th century)					
Northern goshawk (*Accipiter gentilis*)	1	0.7	1		
Golden/white-tailed eagle (*Aquila chrysaetos/Haliaeetus albicilla*)	1	0.7	1		1
White-tailed eagle (*Haliaeetus albicilla*)	1	0.7	1	1 ♂	
Kernavė castle (13th-14th century)					
White-tailed eagle (*Haliaeetus albicilla*)	3	1.2	1	3 ♀	
Merlin/kestrel (*Falco columbarius/tinnunculus*)	2	0.8	1		
Vilnius Lower Castle (13th to middle of 14th century)					
Eurasian sparrowhawk (*Accipiter nisus*)	3	0.4	3	1 ♂, 1 ♀	1
Kestrel (*Falco tinnunculus*)	5	0.6	5	1 ♀	1
Merlin/kestrel (*Falco columbarius/tinnunculus*)	1	0.1	1		
Vilnius Lower Castle (late 14th to early 16th century)					
Northern goshawk (*Accipiter gentilis*)	7	1.3	5	2 ♂, 3 ♀	
Golden eagle (*Aquila chrysaetos*)	1	0.2	1	1 ♂	
Peregrine falcon (*Falco peregrinus*)	1	0.2	1	1 ♂	
Vilnius Lower Castle (middle of 16th to 17th century)					
Eurasian sparrowhawk (*Accipiter nisus*)	2	0.4	1	1 ♂	
Golden eagle (*Aquila chrysaetos*)	1	0.2	1	1 ♂	

Tab. 5 Bird of prey bones from Kernavė town and Vilnius Lower Castle, dated to the 13th to 17th centuries. – (Table A. Zagurskytė).

Bone ID #	Common name (Species)	Dating	Element	$\delta^{13}C$	$\delta^{15}C$	N, %	C, %	C/N atomic ratio	Yield, %
106, 310	Northern goshawk (*Accipiter gentilis*)	1265-1306 calAD, (FTMC-ZZ98-2; 710 ± 28 BP)	Skeleton	-20.88	8.98	16.69	46.28	3.24	14.65
202	Northern goshawk (*Accipiter gentilis*)	Late 14th to early 16th century	Femur	-19.95	7.74	16.81	45.02	3.12	11.31
222	Northern goshawk (*Accipiter gentilis*)	Late 14th to early 16th century	Tibiotarsus	-20.75	8.82	42.00	14.96	2.81	3.28
259	Golden eagle (*Aquila chrysaetos*)	Late 14th to early 16th century	Carpometacarpus	-20.53	7.22	48.12	16.77	2.87	3.35
1245	Northern goshawk (*Accipiter gentilis*)	Late 14th to early 16th century	Tibiotarsus	-21.44	9.13	45.33	16.07	2.82	3.29
1329	Northern goshawk (*Accipiter gentilis*)	Late 14th to early 16th century	Tibiotarsus	-20.59	10.23	44.92	15.89	2.83	3.30
1334	Chicken (*Gallus gallus* var domesticus)	Late 14th to early 16th century	Tibiotarsus	-21.33	7.96	46.21	16.34	2.83	3.30
1395	Golden eagle (*Aquila chrysaetos*)	1300-1401 calAD, (FTMC-ZZ98-3; 613 ± 26 BP)	Sternum	-20.93	10.05	44.55	15.73	2.83	3.30

Tab. 6 Isotopic data of birds from Vilnius Lower Castle. – (Table A. Zagurskytė).

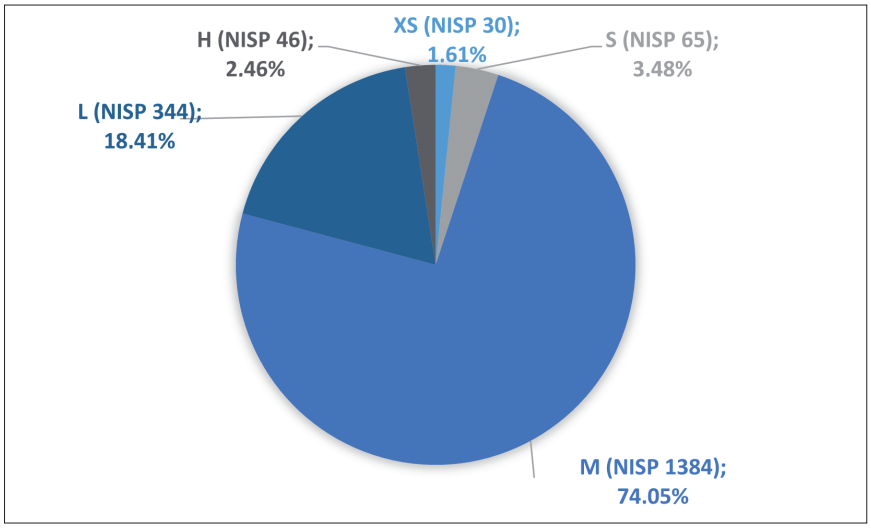

Fig. 7 Distribution of bird size from Vilnius Lower Castle, 13th to 17th centuries. XS: extra small; S: small; M: medium; L: large; H: huge. – NISP = number of identified specimens.

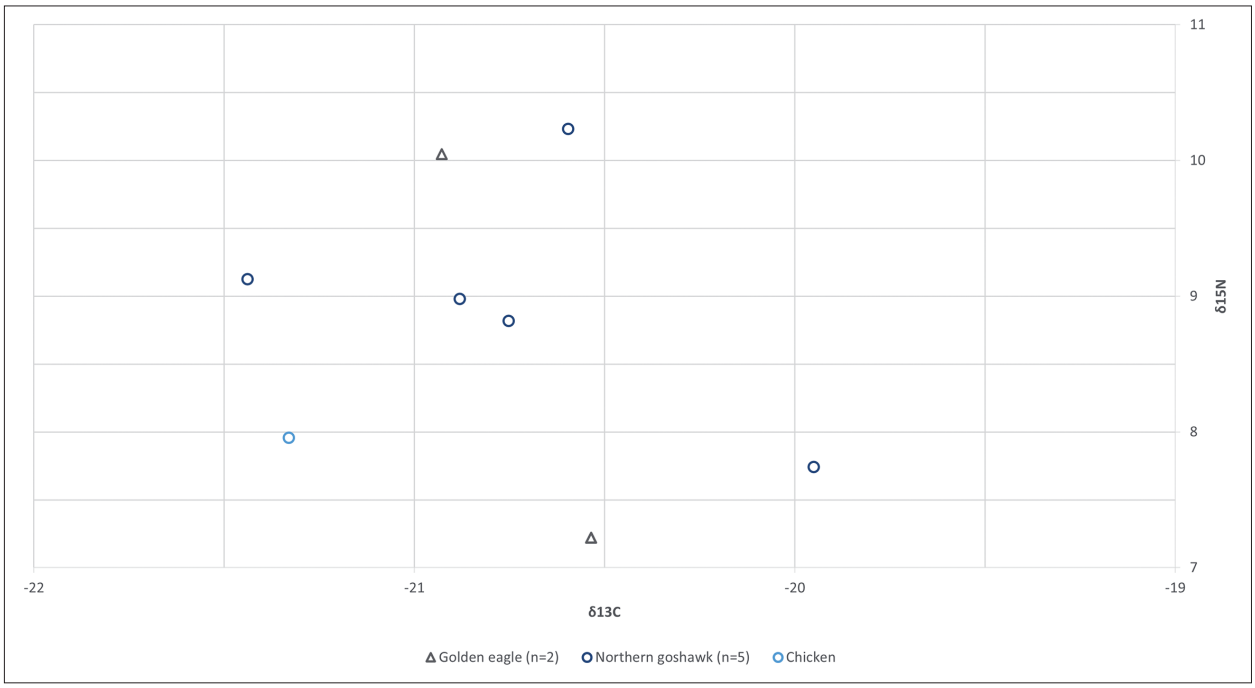

Fig. 8 Scatterplot diagram of stable carbon and nitrogen isotope ratios of golden eagle, northern goshawk and chicken from Vilnius Lower Castle.

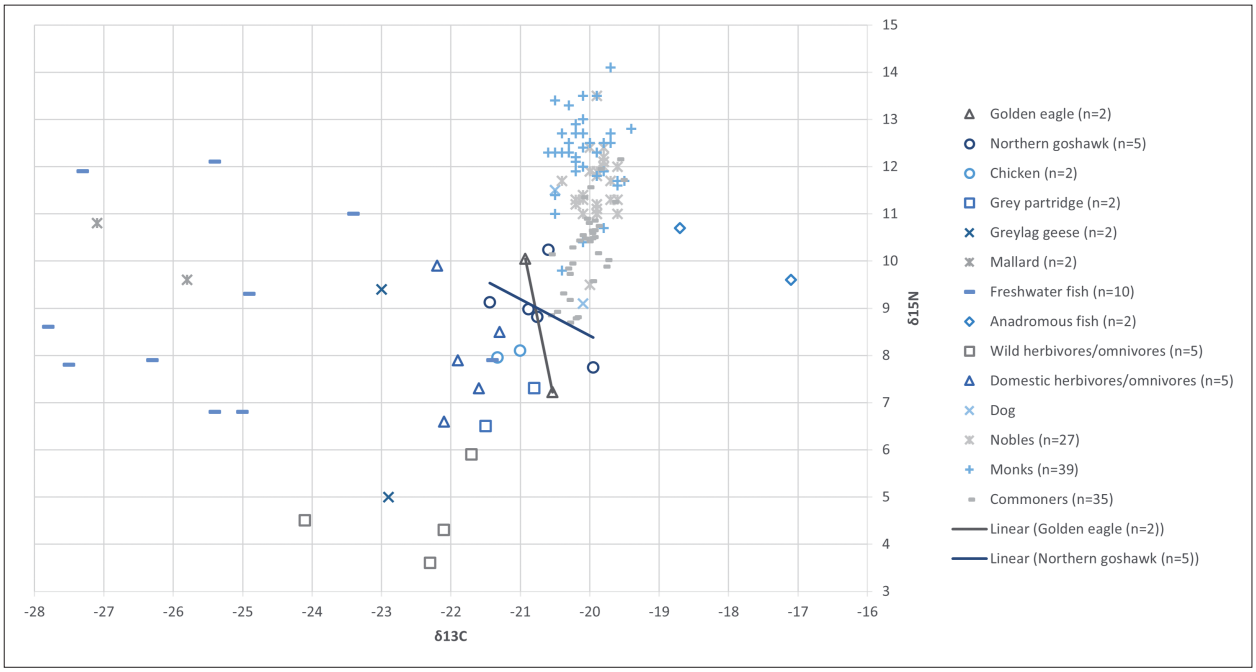

Fig. 9 Scatterplot diagram of stable carbon and nitrogen isotope ratios of medieval and early modern humans and fauna from various archaeological sites in Lithuania. – (After Simčenka et al. 2020).

males. Only one specimen of peregrine falcon (0.1 %, NISP: 1) was identified from the late 14th to the early 16th century.

A total of 21 bones of six raptor species have been identified in Vilnius Lower Castle from all three periods, foremost northern goshawk, but also Eurasian sparrowhawk and kestrel (**tab. 4**). Most of them were attributed as medium-sized birds. However, if we look only at the game birds, the largest part of all game bird bone specimens were of large size. Many of the game bird bones had chopping, cutting and gnawing marks. Cases of splitting are were also present on long leg and wing bones, which is an indication that the birds were used for meat, either for the human diet or as animal fodder (Serjeantson 2009).

There are also several hoods or raptor caps (14th-century layer) from Vilnius Lower Castle which have only survived due to favourable preservation conditions (**figs 10-11**). The largest hood would be perfectly suitable for a saker falcon (*Falco cherrug*) or northern goshawk (*Accipiter gentilis*). However, the cut line and shape itself are more suitable for a falcon. Arguably, this hood belonged to a male gyrfalcon (*Falco rusticolus*) or a female saker falcon. Another hood, a smaller one, could, judging by its shape, also be suitable for a falcon. Based on the measurements, it would suit a female merlin (*Falco columbarius*). The third one, which stands out by its simple design, would fit a saker falcon or gyrfalcon (Blaževičius et al. 2012, 312–313). Only saker falcon and northern goshawk bones were actually found in the castle area.

An exceptional case is the well-preserved skeleton of a female goshawk found together with actual falconry equipment in the form of goatskin jesses on each leg. Analysis shows multiple breakage of bones that were partly healed. The left wing forearm and several left ribs were broken, and it also had a cracked left jaw and broken shoulder blade. Taking into consideration the partial healing of the fractures it can be argued that the bird was still alive for some time before death. It is likely that, although the bird possibly received some treatment, it eventually died from blood poisoning or tissue necrosis (Blaževičius et al. 2012).

Three white-tailed eagle bones, one northern goshawk bone, one golden eagle/white-tailed eagle bone and two merlin/kestrel bones were found in Kernavė town and castle, dating from the 13th/14th centuries. Only one bone was identified as that of a male bird (white-tailed eagle), while three other ones were from females. Also one juvenile golden/white-tailed eagle bone was identified.

Another possible clue to hawking may be the remains of subadult and immature birds of prey. In the Middle Ages, professional hawk catchers took young birds from their nests or caught adult wild birds in various nets and traps (Serjeantson 2009). Some of the freshly captured birds might have died before reaching adulthood and becoming trained hawks, and we may expect to find their remains at archaeological sites (Bochenski et al. 2015). Unfused bones of juvenile and subadult predatory birds were present at Vilnius Lower Castle, which may suggest that these birds were trained for falconry, although it cannot be excluded that they were dispatched as pests.

Findings of eagle remains at all three sites in Lithuania do not necessarily testify to hawking. The extensive, partly wooded wetland areas must have been the perfect habitat for white-tailed eagles, as they need large, quiet, natural areas with sufficient food (waterfowl and fish as well as carrion) and large trees to nest in (Reichstein/Pieper 1986; Brown/Amadon 1989; Serjeantson 2009, 201–202; Ehrlich et al. 2022). In some countries, there were rewards for killing eagles, and their eyries were destroyed as soon as they started nesting (Zeiler 2019). White-tailed eagles are not used in falconry as they hunt out of human sight. It is different with the golden eagle, but this bird, known from falconry in the steppe, has played a role in European falconry only recently (**fig. 12**; cf. Richter 2018).

Previous zooarchaeological analyses of bone remains from Klaipėda Castle, which has so far been left unconsidered in the present article, reflect bird exploitation in its western part in the 13th/14th centuries (Ehrlich et al. 2020). Only certain disarticulated bones were present, suggesting that a particular anatomical part of the birds was used. The dominance of tarsometatarsi and foot phalanges of the birds of prey further supports the idea of a specific use. Cut marks on these bones strongly indicate that the birds were used for their claws. The use of eagles for feathers or the killing of them as scavengers cannot be ruled out entirely either, but in Klaipėda their use for hawking or as meat was unlikely (Ehrlich et al. 2020). Contrary to this, eagles are said to be harmful to geese and swans, and they do great harm to the wild fauna, for which reason the wardens were allowed to shoot them (Illingworth 1969; Oggins 2004).

According to historians, the noblemen of the Grand Duchy of Lithuania were familiar with around 82 bird species, and the most treasured catch in the 14th–16th centuries was black grouse (Samsonowicz 2018). This is also indicated by findings of black grouse bones in Vilnius Lower Castle. Other bird species that were rather intensively hunted were the dove, hazel-grouse, heron, crake, coot, lapwing, woodcock, snipe, thrush, swallow, woodpecker,

Fig. 10 Hard hood for gyrfalcon or Saker falcon from Vilnius Lower Castle. – (Photos V. Abramauskas).

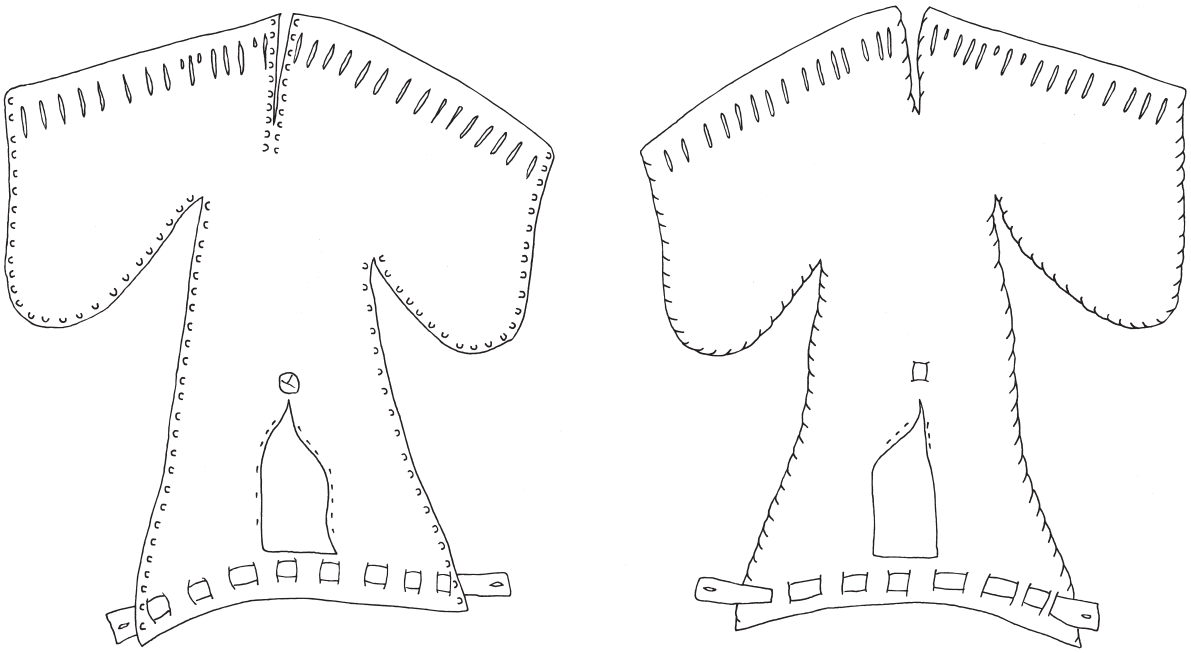

Fig. 11 Technical illustration of a hard hood for a gyrfalcon or Saker falcon. – (Drawing J. Kalėjienė).

Fig. 12 Carpometacarpus of a Golden eagle from Vilnius Lower Castle. – (Photo A. Zagurskytė).

duck, lark, wood-grouse, grey crane, partridge, swan, and grey goose (Zarankaitė-Margienė 2018). Most of these species are present in the Vilnius Lower Castle collection (**tab. 4**).

Written sources mention that the residents of the castle and their guests hunted with at least ten species of birds of prey (Zarankaitė-Margienė 2018). In 16th–17th-century Prussian sources it is also recorded that the most popular birds for falconry were peregrine falcons (Bezzenberger 1889), although the forested landscape would not have been suitable for them. Remains of this species were found at Vilnius Lower Castle, where it was used for falconry according to written sources (Blaževičius et al. 2012, 308; Zarankaitė-Margienė 2018).

As early as the 15th century, there were already a number of peasants appointed as special hunting servants (Ivinskis 1957, 115), who provided the lord's domain with the necessary forest products, animals and poultry. Hunting sessions organised by 15th–16th-century rulers were solely of a recreational nature (Urbanavičius 2010, 329). The regularity of the hunting sessions was more a matter of etiquette than necessity, and they often occurred out of boredom and a desire for distraction (Gurnickis 2009, 34). Hunting in the Grand Duchy of Lithuania began to lose its noble status and became merely a pastime of the ruling elite, whereby animals and birds were shot practically from the residence windows (Cynarsky 2007, 90). However, it is a common assumption in historiography that until the mid-15th century hunting was considered to be a school for the nobility to learn warfare and achieve greatness. In general, long-lasting hunts were used for learning to use weapons, develop cold-bloodedness, learn to control a horse in difficult situations, and in general become accustomed to physical exertion, hardship, and the nature of the wilderness (Blaževičius et al. 2012).

Remarkably, we know of exceptional women in the Grand Duchy of Lithuania who participated in hunting and falconry, such as the Italian princess, Bona Sforza (1494–1557), wife of Sigismund I, King of Poland and Grand Duke of Lithuania, and mother of Grand Duke of Lithuania and King of Poland, Sigismund II Augustus (1520–1572), as well as the Lithuanian noblewoman, Barbara Radziwiłł (1520–1551), second wife of Sigismund II Augustus (Kiaupa 2006; Cynarsky 2007).

Finally, the importance of birds of prey in the society of that time can also be assessed by looking at their prices and the variety of their species. For example, The First Statute of Lithuania (AD 1529) mentions a fine of 12 *groschen* for dismantling a falcon's nest, which is equivalent to the price of illegally hunting a bison (Lazutka et al. 2001).

Conclusion

Chickens and birds in general were not a significant source of protein compared to other animals (Ehrlich et al. 2022) in the period considered here. For example, the excavation at Vilnius Lower Castle in 2019–2020 revealed c. 1000 bird bones but c. 40,000 mammal bones. There is a predominance of cattle and pig, while birds with their rather small meat yield make up only 2.5 % of the material according to the NISP. Moreover, the middle and lower classes, as represented in Kernavė Upper and Lower towns, consumed even less poultry than the elite. However, a diverse number of species, especially turkey, crane, swan and others are present, though they are not that common in the Baltic region. The variety of game birds (2.5–6 % of all faunal remains) and the number of wild animals (28 % of faunal remains) in general reflects the high status of Vilnius Lower Castle, while this is not the case for Kernavė medieval town and castle with its 13th/14th-century dating. Wild animals in Kernavė account for only 1 % of the total faunal remains, with birds even less.

The material from this study adds to the discussion of medieval and early modern hunting with birds of prey. Goshawks were preferred in Lithuania, which in the given period was densely forested, and the birds were kept by professionals who took care of them on a daily basis. As historical records show, hunting with trained birds of prey was an important part of the royal and noble lifestyle during the 13th to 17th centuries. In exceptional cases, the hunters included queens and noblewomen. In addition, according to historical records, keeping and gift-giving of birds of prey were important opportunities for rulers to demonstrate their status at that time.

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Bibliography

Bezzenberger 1889: A. Bezzenberger, Die Kurische Nehrung und ihre Bewohner. Forsch. dt. Landes- u. Volkskd. 3 (Stuttgart 1889).

Bilskienė/Daugnora 2000: R. Bilskienė / L. Daugnora, Paukščiai akmens amžiaus gyvenvietėse. In: A. Girininkas (ed.), Archeologiniai tyrinėjimai Lietuvoje 1998 ir 1999 metais (Vilnius 2000) 567–580.

Blaževičius 2018: P. Blaževičius, Pratarmė. In: Vilniaus pilių fauna: nuo kepsnio iki draugo (Vilnius 2018) 10–17.

2022: P. Blaževičius, Arkikatedros bazilikos, Žemutinės ir Aukštutinės pilių pastatų, jų liekanų ir kitų statinių komplekso Žemutinės pilies rūmų liekanų (u.k. 24705) teritorijos (LDK Valdovų rūmų G rūsio) detaliųjų archeologinių tyrimų 2019–2020 m. ataskaita [excavation report, Lietuvos istorijos institutas, Vilnius 2022].

Blaževičius et al. 2012: P. Blaževičius / S. Rumbutis / T. Zarankaitė, Medžiokliniai, medžiojamieji ir naminiai paukščiai Vilniaus Žemutinėje pilyje XIV-XVI a. naujausių tyrimų duomenimis. Chr. Pal. Magn. Ducum Lithuaniae 2, 2012, 299–319.

Bochenski et al. 2015: M. Z. Bochenski / T. Tomek / K. Wertz / M. Wojenka, Indirect evidence of falconry in medieval Poland as inferred from published zooarchaeological studies. Wiley Online Library 26(4), 2015, 661–669.

Brown/Amadon 1989: L. Brown / D. Amadon, Eagles, Hawks and Falcons of the World (New York 1989).

Cynarsky 2007: S. Cynarsky, Žygimantas Augustas (Vilnius 2007).

Daugnora/Girininkas 2004: L. Daugnora / A. Girininkas, Kretuono 1C gyvenvietės bendruomenės gyvensena. Lietuvos Arch. 25, 2004, 233–250.

2012: L. Daugnora / A. Girininkas, Hunting in the territory of Lithuania from the Late Palaeolithic to the Middle Ages. In: O. Grimm / U. Schmölcke (eds), Hunting in Northern Europe until 1500 AD. Old Traditions and Regional Developments, Continental Sources and Continental Influences. Schr. Arch. Landesmus. Schloss Gottorf, Ergr. 7 (Neumünster 2012) 567–596.

Daugnora et al. 2002: L. Daugnora / R. Bilskienė / A. K. Hufthammer, Bird remains from Neolithic Bronze Age settlements in Lithuania. Acta Zool. Cracoviensia 45, 2002, 233–238.

DeNiro 1985: J. M. DeNiro, Postmortem preservation and alteration of in vivo bone collagen isotope ratios in relation to palaeodietary reconstruction. Nature 317, 1985, 806–809.

Von den Driesch 1976: A. von den Driesch, A Guide to the Measurement of Animal Bone from Archaeological Sites. Peabody Mus. Bull. 1 (Harvard 1976).

Ehrlich et al. 2020: F. Ehrlich / G. Piličiauskienė / M. Urbonaitė-Ubė / E. Rannamäe, The Meaning of Eagles in the Baltic Region. A Case Study from the Castle of the Teutonic Order in Klaipėda, Lithuania (13th–14th Century). Arch. Lituana 21, 2020, 59–78.

2022: F. Ehrlich / G. Piličiauskienė / P. Blaževičius, Bird remains from Vilnius Lower Castle, Lithuania (13th–19th centuries) reveal changes in social status and unusual bird pathologies. Internat. Journal Osteoarch. 33(4), 2022, 731–741.

Gurnickis 2009: L. Gurnickis, Lenkų dvariškis (Vilnius 2009).

Harrison/Stewart 1999: C. J. O. Harrison / R. J. Stewart, Avifauna. In: M. B. Roberts / S. A. Parfitt, Boxgrove: A Middle Pleistocene Hominid Site at Eartham Quarry, Boxgrove, West Sussex. Arch. Report 17 (London 1999) 187–196.

Illingworth 1969: F. Illingworth, Falcons and Falconry (London 1969).

Ivinskis 1959: Z. Ivinskis, Medžioklė: senovės Lietuvoje. In: Lietuvių enciklopedija 18 (Vilnius 1959) 113.

Kiaupa 2006: Z. Kiaupa, Lietuvos valstybės istorija (Vilnius 2006).

Van Klinken 1999: G. J. van Klinken, Bone collagen quality indicators for palaeodietary and radiocarbon measurements. Journal Arch. Scien. 26(6), 1999, 687–695.

Kuncevičius et al. 2019: A. Kuncevičius / I. Merkytė / J. Poškienė / R. Prapiestienė / R. Vengalis / G. Vėlius / J. Volungevičius, Landscape transformations in the historical capitals of Lithuania during the 13th–14th centuries. Acta Arch. 90(2), 2019, 181–202.

Makowiecki 2009: D. Makowiecki, Animals in the landscape of the medieval country side and urban agglomeration of the Baltic Sea countries. In: A. Castagnetti (ed.), Cittá e campagna nei secoli altomedievali: Spoleto, 27 marzo – 1 aprile 2008. Settimane di studio del Centro italiano di studi sull'altomedioevo 56, 1 (Spoleto 2009) 427–444.

Oggins 2004: S. R. Oggins, The Kings and their Hawks: Falconry in medieval England (New Haven 2004).

Piličiauskas et al. 2017: G. Piličiauskas / R. Jankauskas / G. Piličiauskienė / T. Dupras, Reconstructing Subneolithic and Neolithic diets of the inhabitants of the SE Baltic coast (3100–2500 cal BC) using stable isotope analysis. Arch. Anthr. Scien. 9(7), 2017, 1421–1437.

Lazutka et al. 2001: S. Lazutka / I. Valikonytė / E. Gudavičius (eds), Pirmasis Lietuvos Statutas (1529 m.) (Vilnius 2001).

Piličiauskas et al. 2019: G. Piličiauskas / D. Kisielienė / G. Piličiauskienė / L. Gaižauskas / A. Kalinauskas, Comb Ware culture in Lithuania: new evidence from Šventoji 43. Lietuvos Arch. 45, 2019, 67–103.

2023: G. Piličiauskas / E. Pranckėnaitė / A. Matiukas / G. Osipowicz / K. Peseckas / J. Kozakaitė / A. Damušytė / E. Gal / G. Piličiauskienė / H. K. Robson, Garnys: an underwater riverine site with delayed Neolithisation in the southwestern Baltic. Journal Arch. Scien.: Reports 52(8), 2023. DOI: 10.1016/j.jasrep.2023.104232.

Poland 2018: J. G. Poland, A Methodological Approach to the Identification of Duck and Goose Remains from Archaeological Sites with an Application to Roman Britain [PhD thesis, Univ. Sheffield 2018].

Rackevičius 2009: G. Rackevičius, Vilniaus pilies teritorijos tyrimai 2002–2009 metais. In: A. Girininkas (ed.), Archeologiniai tyrinėjimai Lietuvoje 2009 metais (Vilnius 2009) 164–182.

Reichstein/Pieper 1986: H. Reichstein / H. Pieper, Untersuchungen an Skelettresten von Vögeln aus Haithabu. Ausgrabung 1966–1969 (Neumünster 1986).

Reimer et al. 2020: P. J. Reimer / W. E. N. Austin / E. Bard / A. Bayliss / P. G. Blackwell / Ch. Bronk Ramsey / M. Butzin / H. Cheng / R. L. Edwards / M. Friedrich / P. M. Grootes / Th. P. Guilderson / I. Hughen / T. J. Heaton / A. G. Hogg / K. A. Hughen / B. Kromer / S. W. Manning / R. Muscheler / J. G. Palmer / Ch. Pearson / J. van der Plicht / R. W. Reimer / D. A. Richards / E. M. Scott / J. R. Southon / Ch. S. M. Turney / L. Wacker / F. Adolphi / U. Büntgen / M. Capano / S. M. Fahrni / A. Fogtmann-Schulz / R. Friedrich / P. Köhler / S. Kudsk / F. Miyake / J. Olsen / F. Reinig / M. Sakamoto / A. Sookdeo / S. Talamo, The Intcal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP). Radiocarbon 62, 2020, 725–757.

Richter 2018: Th. Richter, Practicalities of falconry, as seen by a present-day falconer. In: K.-H. Gersmann / O. Grimm (eds), Raptor and Human – Falconry and Bird Symbolism throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 1 (Kiel, Hamburg 2018) 55–86.

Rumbutis et al. 2018: S. Rumbutis / P. Blaževičius / G. Piličiauskienė, Paukščiai Vilniaus pilyse. In: P. Blaževičius (ed.), Vilniaus pilių fauna: nuo kepsnio iki draugo (Vilnius 2018) 104–130.

Samsonowicz 2018: A. Samsonowicz, Falconry in the history of hunting in the Poland of the Piasts and the Jagiellons (10th–16th centuries). In: K.-H. Gersmann / O. Grimm (eds), Raptor and Human – Falconry and Bird Symbolism throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 1 (Kiel, Hamburg 2018) 1491–1506.

Serjeantson 2009: D. Serjeantson, Birds. Cambridge Manuals Arch. (Cambridge 2009).

Simčenka et al. 2020: E. Simčenka / M. Jakulis / J. Kozakaitė / G. Piličiauskienė / K. Lidén, Isotopic dietary patterns of monks: Results from stable isotope analyses of a seventeenth–eighteenth century Basilian monastic community in Vilnius, Lithuania. Arch. Anthr. Scien. 12, 2020. DOI: 10.1007/s12520-020-01063-9.

Szidat et al. 2017: S. Szidat / E. Vogel / R. Gubler / S. Lösch, Radiocarbon dating of bones at the LARA Laboratory in Bern, Switzerland. Radiocarbon 59, 2017, 831–842.

Urbanavičius 2010: V. Urbanavičius, Lietuvos didžiųjų kunigaikščių rezidencija Vilniuje (Vilnius 2010).

Vaičiūnienė 2000: D. Vaičiūnienė, Kernavės Viršutinio Miesto Tyrinėjimai. In: A. Girininkas (ed.), Archeologiniai Tyrinėjimai Lietuvoje 1998 ir 1999 m. (Vilnius 2000) 131–134.

2001: D. Vaičiūnienė, Kernavės viršutinis miestas. In: A. Girininkas (ed.), Archeologiniai Tyrinėjimai Lietuvoje 2000 m. (Vilnius 2001) 40–41.

2002: D. Vaičiūnienė, Kernavės viršutinis miestas. In: A. Girininkas (ed.), Archeologiniai Tyrinėjimai Lietuvoje 2001 m. (Vilnius 2002) 59–60.

2003: D. Vaičiūnienė, Kernavės piliakalnio III, vadinamo lizdeikos kalnu, aplinka. In: A. Girininkas (ed.),

Archeologiniai Tyrinėjimai Lietuvoje 2002 m. (Vilnius 2003) 40–41.

Vėlius 2005: G. Vėlius, Kernavės miesto bendruomenė XI-II-XIV amžiuje (Vilnius 2005).

2019: G. Vėlius, Tyrimai Kernavės archeologinėje vietovėje. In: A. Girininkas (ed.), Archeologiniai Tyrinėjimai Lietuvoje 2019 m. (Vilnius 2019) 76–79.

2022: G. Vėlius, Kernavės archeologinės vietovės (37320) 2021 detaliųjų archeologinių tyrimų ataskaita [excavation report, 2022].

Vėlius et al. 2021: G. Vėlius / R. Vengalis / M. Pilkauskas, Kernavės Aukuro kalno piliakalnio tyrimai. In: A. Girininkas (eds), Archeologiniai Tyrinėjimai Lietuvoje 2021 m. (Vilnius 2021) 93–97.

Vitkūnas 2006: M. Vitkūnas, Kernavės miestas XIII-XIV amžiuje. In: Musninikai. Kernavė. Čiobiškis (Vilnius 2006) 63–124.

Zarankaitė-Margienė 2018: T. Zarankaitė-Margienė, Medžioklės fenomenas Lietuvos didžiojoje kunigaikštystėje XV-XVI a. (1572 m.): socioekonominis, sociopolitinis, mentalinis aspektai [PhD thesis, Vilnius Univ. 2018].

Zeiler 2019: J. Zeiler, The white-tailed eagle (*Haliaeetus albicilla*) in the Netherlands: changing landscapes, changing attitudes. Arch. Anthr. Scien. 11(4), 2019, 6371–6375.

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Bears as Animal Agents, Symbols and Prey

Ekaterina Kashina · Vladislav Zhitenev

Hunters and Bears throughout the Stone Age of Eastern Europe and the Urals according to Archaeological Data

ABSTRACT

This paper presents a review of the archaeological sources that allow the investigation of the place of the cave/brown bear in the life of hominids and human populations during the Stone Age and up to the Early Bronze Age. Based on the bear bone find data we discuss hunting issues, tool making and ritual aspects connected with bears. The topic of Prehistoric rock art and portable art is discussed as well. We conclude that although the value of the bear as hunting prey was higher in the Holocene than in previous eras the bear definitely had some constant role(s) in the spiritual life of hunters in both epochs. The absence of bear images in the portable art of the eastern European Neolithic is of particular interest, whereas those images are met from time to time in northern rock art. At the turn from the Stone to the Early Bronze Age, bear effigies became visible in the material culture as portable art, which can be connected with the rise of new beliefs brought by the first herders.

KEYWORDS

Brown bear / cave bear / osseous remains / art / Palaeolithic / Mesolithic-Neolithic / Bronze Age / hunter-gatherer-fishers / East European Plain / Urals

Introduction

The East European Plain represents a huge geographical space, which was partly covered by glaciation in the Pleistocene and has been inhabited by humans since the Acheulean. A study of long-term questions, such as the role of bears in the economy and spiritual life of the eastern European Late Pleistocene and Early/Mid-Holocene hunter-gatherer-fishers, seems to be required, as comprehensive studies for the Upper Palaeolithic have only rarely been published in English, quite a long time ago (Soffer 1985), and no such study has yet been performed for the Early/Mid-Holocene (however, for a review see Piezonka 2021). Relatively recent publications on this topic have been written mostly in Russian and are »hidden« in various national journals and collections of papers. Studies concerning bears and bear images in the Stone Age have been carried out by the present authors (Zhitenev 2000; Kashina/Khramtsova 2023).

Here, we make an attempt to compare two successive eras of European humankind – the Late Pleistocene and the Early/Mid-Holocene – in a *long durée* perspective (**tab. 1**) by reconstructing the human attitude to bear species, based exclusively on the archaeological data. We will concentrate on the following questions: the ratio of profane (economical/survival) and spiritual (ritual/sacred) issues of bear perception, and the possible peculiarities and meanings of the bear in both eras (see **fig. 1** for the majority of sites mentioned in this text).

We will start by discussing the osteological issues and the sphere of prehistoric bear hunting, followed by the making of bear bone tools and the traces of

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Fig. 1 Late Pleistocene and Holocene sites mentioned in the text that yielded bear bones, effigies and rock art images. – (Map M. Bolte, LEIZA).

actions performed with bear bones (exhibition and manipulation traces). Finally, we will turn to the observation of bear images in art, including not only monumental and portable art, but also the making of personal ornaments from osseous bear remains, and will lastly discuss the place of bears in funeral rites. As a result, such a *long duree* consideration will shed light on prehistoric human-bear interaction in the northern hemisphere.

The Background of the Study

Unfortunately, the numbers of archaeological sources for eastern Europe are very unequal for the Late Pleistocene and the Early/Mid-Holocene, respectively, which causes uncertainties in many fields of study when it comes to interpretation. Also, the ways of life of hunter-gatherer-fishers in both eras were very different in many ways, although both mobile and sedentary hunters, for example, existed in the cold Eurasian steppes during the Upper Palaeolithic as well as in the Early Holocene (Koltsov 1989; Wojtal et al. 2015). Sedentism developed to a notable degree only in the Mid-Holocene after the turn from the 6th to the 5th millennium BC, being part of what some researchers call the »Northern Neolithic revolution«, a process that reached its apogee around 3500–3000 cal BC elsewhere in the Finnish/eastern Baltic/East European forest zone and was characterized by the extensive presence of ceramic vessels, flint flake-based tools, large semi-subterraneous dwellings, settlement cemeteries, trans-regional exchange, and

Period	Chronological frame
Late Pleistocene	129,000-11,700 BP
Middle Palaeolithic	300,000-30,000 BP
Upper Palaeolithic	50,000-12,000 BP
Acheuleen	180,0000-150,000 BP
Mousterian	160,000-40,000 BP
Aurignacian	40,000-30,000 BP
Gravettian	33,000-22,000 BP
Pavlovian	29,000-25,000 BP
Epigravettian	21,000-13,000 BP
Magdalenian	17,000-11,000 BP
Mesolithic/Early Holocene	12,000-8,000 BP
Middle Holocene	8,000-4,200 BP
Neolithic (Russian chronolgy)	6,000-3,000 cal BC
Early Neolithic (Russian chronology)	6,000-4,500 cal BC
Late Neolithic (Russian chronology)	3,500-3,000 cal BC
Early Bronze Age (Russian chronology)	3,000-2,200 cal BC

Tab. 1 Chronological periods discussed in the article.

the use of exotic items, such as amber ornaments and standardized metatuff woodworking tools (Herva et al. 2013; Tarasov/Nordqvist 2022). Later on, on the turn of the 4th to the 3rd millennium BC, which in many eastern European regional terminologies is called the beginning of the Early Bronze Age, the influence of herders, archaeologically known as the Corded Ware and Battle Axe cultures, can be recognized. This movement of people occurred in eastern Europe in a north-westerly direction along the main river valleys of the forest zone (Nordqvist/Heyd 2020). Only the barest evidence of the presence of these herders is visible in the territory of modern Russia to the north of the 58th latitude, in the taiga zone, basically reflected in changes in the local ceramic types and the appearance of ritual figural stone hammer-axes (see below).

A new chapter of bear exploitation and worship (already outside the scope of our study) starts in the Middle and Late Bronze Age, largely characterized by remains of pastoralist communities in eastern European archaeological data, except for the northernmost latitudes where »pure« hunter-gatherer-fishers existed up to the Middle Ages or even until modern times.

The Bear in the Profane Sphere

Bear Hunting through the Lens of Osteology

The hunting of both species, i. e. the cave bear (*Ursus spaeleus*) and the brown bear (*Ursus arctos*) is documented for the Middle Palaeolithic in the territory of western and central Europe, but for the Upper Palaeolithic (Gravettian) the number of contexts increases exponentially. Researchers generally agree that bear hunting was performed in all European areas of human habitation (Wojtal et al. 2012).

The main evidence for bear hunting is the presence of cutmarks on bear bones that show various actions, such as killing, skinning, dismemberment, defleshing and filleting as well as holes that could point to marrow extraction. The earliest western European contexts may belong to the Middle Palaeolithic, but far more cases come from the pan-European Upper Palaeolithic (Wilczyński et al. 2015). This includes rare examples of flint projectile fragments embedded in bear bones (Münzel/Conard 2004; Germonpré/Hämäläinen 2007, 12). In contrast, bear bones in natural deposits in caves and grottos, primarily connected with *Ursus spaeleus* individuals that had died of natural causes during hibernation, can sometimes carry the traces of scavenger teeth on them (see e. g. Stiner 2010). Along with the already known western and central European contexts of bear bone cutting in the Middle Palaeolithic (Wojtal et al. 2015; Majkić et al. 2018), a curious find came to light in the Imanay Cave (Southern Urals, Russia). The skull of a small cave bear (*Ursus spelaeos savini*) was found among a large collection of naturally deposited bones mixed with stone tools and debris of the Mousterian techno-complex, with a lens-like hole that was most probably caused by the impact of a Mousterian projectile. The skull was directly dated to 38,567–37,754 cal BC (IGAN–5652; Gimranov et al. 2021). In our view, the hole is not enough proof that this cave bear was hunted: the skull could have been hit with the stone tool after the cave bear's death. Moreover, during the study of the ten thousand pieces of faunal remains collected there, no more cut- or other marks were detected (Gimranov et al. 2021).

The presence of bear bones, both of cave bear (rarely) and brown bear (more often), at the open-air sites of the Upper Palaeolithic allows us to assume their

purely profane/economic use with more certainty and to classify them in many ways: as kitchen waste (bones with cutmarks), fuel for fireplaces, remains of food storage (hidden meat parts, never retrieved) or raw material (for tools), and as the probable remains of bear skins (phalanges, claws). According to the percentage of bear remains at such sites in central and eastern Europe, both cave bear and brown bear were hunted and utilized, but only to a very moderate degree. Cave bears were mostly extinct all over Europe and the Urals around 25,000–20,000 years ago for, as scholars propose, multi-causal reasons: increasing isolation of the populations, a rise in cave water level, and so on (Wojtal et al. 2015; Gimranov/Kosintsev 2022).

The number of bear bone finds at the open-air sites of the East European Plain is estimated as being even more moderate in comparison with the central and western European materials. The finds allow us to suggest that the game was butchered elsewhere and only chosen parts were taken to the sites. Among the group of seven Upper Palaeolithic sites at Kostenki (Voronezh region, Russia), where the material mostly belongs to the Gravettian period, between one and four brown bear bones were detected at each find spot. Only one cave bear bone was found at site 3 of Kostenki 3[1]. The small short-term site Semenivka I (Kyiv region, Ukraine) yielded an otherwise rare substantial part of a brown bear carcass (21 bones), found in a pile together with mammoth remains. One of these bones was directly dated (conventional radiocarbon method) to the Epigravettian (Nuzhniy 1997). According to the data obtained in the Urals region, the number of cave bear bones at the open-air sites of the Late Mousterian (Bogdanovka I: 5 bones) and Upper Palaeolithic (Gari I: 3 bones) is extremely low (Kosintsev/Plasteeva 2015, 94).

In the Early and especially the Mid-Holocene, the evidence of extensive brown bear hunting along the East European forest zone is proven by numerous cases of bone finds (Koltsov 1989; Oshibkina 1996), though, unfortunately, the federal and local museums in Soviet and post-Soviet times usually refused to keep faunal remains, which resulted in the loss of much Stone Age osteological material for modern analyses. Nevertheless, some large collections survived and archive materials left by some Soviet scholars, for example, the prominent osteologist E. G. Andreeva (Kazan Branch of the Academy of Sciences, USSR), were partly published. According to her statistics (Andreeva 1974a; 1974b; cited and discussed in Kashina/Khramtsova 2023), at the Chornaya Gora settlement in central Russia (second half of the 4th millennium BC, Ryazan region) brown bear osseous remains take third place in quantity after those of elk (*Alces alces*) and marten (*Martes martes*), while at the neighbouring settlement of Vladychino, dated to the same time period, elk, marten and wild boar bones (*Sus scrofa*) dominated, followed by those of brown bear. The abundance of wood in the hearths of the forest zone settlements allows the suggestion that large bones were no longer used as fuel. The constant place of the brown bear among the most desired game animals can be explained by the need of highly valuable products, such as bear meat, bones, teeth, fat, guts, and skin/fur. The last three materials were indispensable from the Inuit point of view, as witnessed by ethnographical data (Fienup-Riordan 2007). Even now, brown bear hunting continues to exist in taiga regions throughout the Russian forest belt.

Bear Bone Tools

The use of bear bones in the Upper Palaeolithic was not limited to nutritional and heating needs. Sporadically, bones have been used to make tools. The baculum bones found at the German and Croatian cave sites were most probably obtained by butchering, and they carry traces of modification and of a use as awls (Münzel et al. 2021). These bones' spiritual significance will be discussed later. An awl made of a bear tibia is known from the Pavlov I site, in the Czech Republic (Wojtal et al. 2015, 63). Another case is a 21-cm-long »knife« with a retouched blade made of a longitudinally split tubular bear bone from the »Hall of Signs« of the famous Kapova (Shulgan-Tash) Cave with Upper Palaeolithic paintings in Bashkortostan, Southern Urals, Russia (**fig. 2, 1**; see Schelinskiy 1997).

Among the Mid-Holocene contexts of central Russia (Chornaya Gora, Ryazan region, second half of the 4th millennium BC), again from the archive materials of E. G. Andreeva, we are aware of a wide spectrum of household and hunting tools made of different brown bear bones: awls of canine teeth and fibula/radius bones, chisels of radius bones, a hoe of a radius as well as daggers and a dented point made of an ulna (Andreeva 1974a; 1974b; cited and discussed in Kashina/Khramtsova 2023). The modified baculum from the neighbouring and synchronous Shagara II site, with a drilled hole for fastening, has a sharpened and partly damaged tip; it was obvious-

1 Personal communication, Dr Maria Zheltova, 11.8.2022.

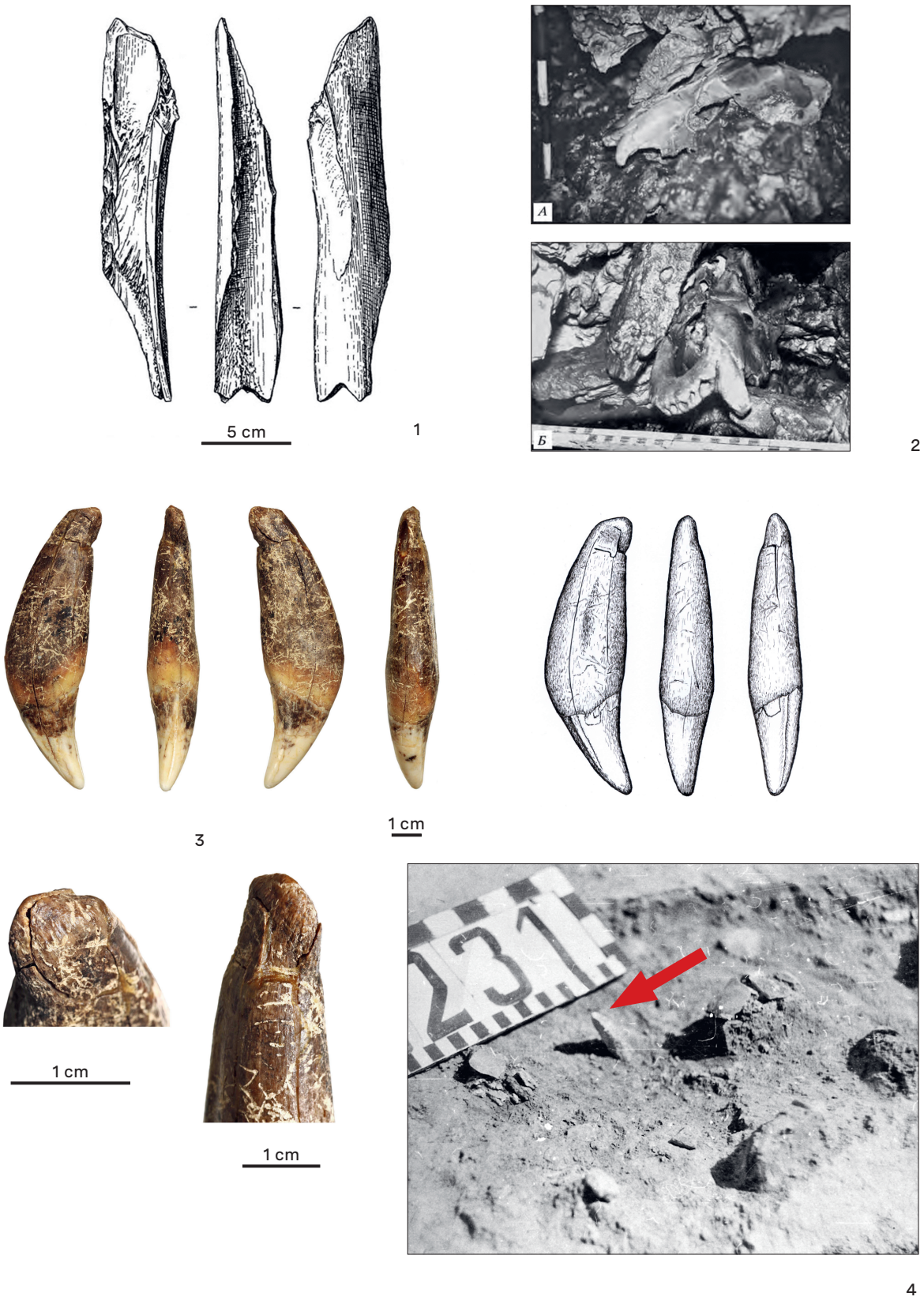

Fig. 2 Palaeolithic finds of bear bone/tooth effigies and bear skulls. **1** Kapova Cave. – **2** Zapovednaya Cave. – **3** Khotylevo 2 site. – **4** Kamennaya Balka II site. – (After Leonova 1994; Schelinskiy 1997; Kotov 2012; Gavrilov 2013; reproduced with permission of V. Schelinskiy, V. Kotov, K. Gavrilov and E. Vinogradova).

ly used as an awl (**fig. 3**). The rich faunal collection of the Shagara II site has still not been studied in its entirety.

To sum up, a »profane« use of bears was common for any hunting society that had the opportunity to kill this animal. Scholars suppose that the preferable period for hunting both cave and brown bears was during hibernation in winter/spring (Münzel/Conard 2004, 882; Germonpré/Hämäläinen 2007, 10). In the Upper Palaeolithic, both cave bear (herbivore) and brown bear (omnivore) were hunted by humans (Wojtal et al. 2015), but seemingly the terms/seasons and methods could have been very different. The bears' dietary preference was established by tooth microwear and stable isotope analyses of bone or tooth enamel (Münzel et al. 2014).

Fig. 3 Late Neolithic (second half of the 4th millennium BC) brown bear baculum used as an awl from the Shagara II site, Ryazan region. – (Photo I. Seden'kov, courtesy State Historical Museum, Moscow).

From Food to Rites? Bear Bone Manipulation and Exhibition

The so-called Palaeolithic bear cult has been widely discussed in both English and Russian literature (for general conclusions see: Stolyar 1985; Zhitenev 2000; Wojtal et al. 2015; Münzel et al. 2021). Despite the initial exaggeration of the quantity of »artificial« (man-made) European Palaeolithic cave complexes with the skulls/bones of cave bears, manipulation has been proven for a number of cases. The western and central European contexts, such as the exhibition of cave bear skulls (for example in Chauvet Cave, France) and bear bones stained by/painted with red ochre (caves in Belgium, France and Italy; see Germonpré/Hämäläinen 2007, 11) have already been well described, so here we will pay attention to several Russian finds that are definitely less known.

In the Sikiyaz-Tamak Cave (Southern Urals, Chelyabinsk region), a cave bear skull was found by cavers, and it shows a hole, cut marks and stains of red pigment on the left part of the forehead. Archaeological excavations documented the remains of human activity in the cave hall, dated by charcoal to the Final Palaeolithic (Zhitenev 2006). In the Zapovednaya Cave (Southern Urals, Bashkortostan), several niches and stone constructions were filled with cave bear skulls, covered by a calcite crust (**fig. 2, 2**). The excavation in this place has brought to light a small amount of stone artefacts. Several charcoal samples were dated to 12,400–10,000 cal BC, according to conventional radiocarbon analysis (Kotov 2012, 23). In both cases, the datings do not provide proof that the exhibited cave bear skulls belong to this period. Without direct dating, their age remains unknown. In western Europe, such »artificial« cave complexes are dated to the Middle Palaeolithic or Early Upper Palaeolithic. However, this does not necessarily mean that the South Ural contexts belong to the same periods.

Extensive bear bone manipulation was found at the open-air site of Khotylevo 2 (Bryansk region), which is dated to the Gravettian, and this seems to be so far unique for the East European Plain. A pit with a diameter of 1 m and a depth of 0.5 m, seemingly a former fireplace, contained two mammoth skulls with ribs deliberately put into the eye sockets, fragments of tusks, some bone tools stained by red pigment, flint-working debris, and a fragment of a bear skull (Gavrilov 1998, 187–189). It is difficult to interpret this case in a persuasive manner.

Two unusual contexts of brown bear canines should be mentioned: a canine placed (or dug) upright into the occupation surface (Kamennaya Balka II site, Rostov region, 19,000–16,000 cal BP), and a lower canine pendant with an incision at the root at Khotylevo 2. This was also found upright (with its root up) in a deliberately made small pit filled with ochre, flint and bone debris (**fig. 2, 3-4**; see Gavrilov et al. 2013).

The interpretation of all these osseous objects remains unclear; they can only be described in terms of particular human behavior. Only certain parts of the bear carcass were taken and arranged further.

Bears in the Art of Pleistocene/Holocene Hunters

Pleistocene: Cave Art and Portable Art

Scholarly literature on the description and analysis of bear images in western European Upper Palaeolithic art is extensive (summarized by De Swart 2004). According to his review, the most intriguing topic is the distinction of cave and brown bear images in cave and portable art. The focal point is the discussion about the Chauvet Cave bear images' dating and which species of bear they represent. The cave bear became extinct in western Europe approximately 20 millennia ago, which is about the time when the entrance to this cave was naturally sealed, so the question has emerged regarding the accuracy of the paintings' dating and about the criteria of distinguishing cave and brown bears in Upper Palaeolithic rock and portable art.

The prominent forehead is believed to be the main marker of a cave bear image (Braun/Zessin 2008). The authors attempt to distinguish all plausible bear images with the help of a zoologist, who came to the conclusion that, in most cases, the depictions were of brown bears. Besides the images from Chauvet cave, for example, the stone engravings (portable art) from Gazel and Massat caves (France) were attributed to cave bears, but there was an obvious anomaly, as the latter two find spots are dated to the Magdalenian, a time period when practically no cave bears existed anymore. There may have been an artistic exaggeration of the brown bear's forehead, but still the group of Chauvet cave images could truly represent cave bears. The intriguing group of 17 bear images depicts the hunted animal, including the focal point of a hunt – the killing of the animal (De Swart 2004, 124).

Bear images are underrepresented in cave art by quantity and they constitute only about 2 % of all images in general, which mainly focus on large ungulates and mammoths. Thus, we can suspect a correlation between the low economic meaning of bears and, accordingly, the small number of bear images in cave art. But let us turn to the portable art of the late glacial hunters.

In western and central European portable art, the bear image is generally represented in Aurignacian ivory sculptures, Gravettian (Pavlovian) ceramic sculptures and Gravettian/Magdalenian engravings on slate objects, and on bone/antler tools (Braun/Zessin 2008).

What is perhaps the most ancient known bear sculpture in Russia was found far away from the East European Plain, on the Trans-Baikal site of Tolbaga, attributed to 35–25 millennia BC, based on conventional radiocarbon dating results of the site's faunal remains. A modified wooly rhinoceros vertebral fragment shows a bear (?) muzzle, nostrils and mouth (Konstantinov et al. 1983). As no comprehensive drawings and photos of the item are published, the question of its authenticity is still open.

Futhermore, the Gravettian small stylized marl sculptures of the Kostenki 1 (layer 1) and Kostenki 4 sites (Voronezh region, Middle Don River basin), usually found in fragments (heads/torso, eight pieces in total), may represent bear images (Khlopachev 2018, fig. 2).

The problem of correct zoological interpretation equally concerns portable art and cave paintings and engravings. The bear image can be easily confused with that of a felid (cave lion). Also, the distinction between cave and brown bear is problematic in the particular case of the Aurignacian, when these two species co-habited. The famous bear sculpture from the Vogelherd Cave (Germany) is made of mammoth ivory (Wamers 2015; Dutkiewicz 2021, 81–82). The best, though still ambiguous bear representations in eastern European portable art are the so-called spatulae from the Kostenki 1 (layer 1) and Avdeevo sites (Voronezh and Kursk regions), dated to the Gravettian. Their handles are believed to represent a stylized head each, seemingly a zoomorphic one, through which eyes (sometimes two pairs of them) have been carved. Some pieces have small, elaborate, rounded ears that resemble those of a bear (**fig. 4**). The corresponding decoration, made by linear incisions, of all 64 pieces forms three transversal belts. B. Hromadova (2012) compared these decorations with the eastern Gravettian ivory female sculpture décor and described some correlations. Thus, there is not enough proof that these spatulae really are stylized bear representations.

One of the most notable conclusions made on the basis of western, central and eastern European Upper Palaeolithic zoomorphic portable art is that the amount of osseous material from hunted species does not correlate with the presence and/or amount of corresponding animal representation in portable art (Dutkiewicz 2021). This observation leads further to the conclusion that some species were hunted and eaten, while others were represented in portable art. So far, it is impossible to explain this pattern properly.

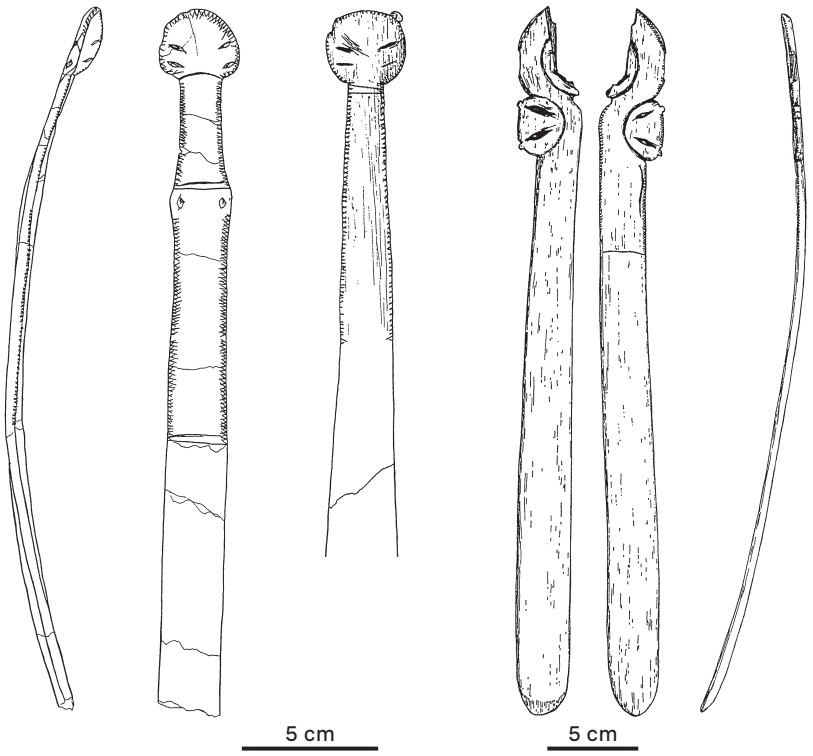

Fig. 4 Spatulae from the Avdeevo Upper Palaeolithic site, Bryansk region. – (Drawings from the personal archive of M. D. Gvozdover, Chair of Archaeology, Faculty of History, Lomonosov Moscow State University, reproduced with permission of E. Vinogradova).

Another branch of portable art are modified bear teeth, having either a drilled hole or a notch/circular incision for fastening. In western Europe, bear canine pendants are known from the Aurignacian onwards. In the Magdalenian, the number of finds seemingly increased slightly both in settlement and burial contexts, for example in Trou de Chaleux and Abri Duruthy in France (Germonpré/Hämäläinen 2007, 13; Wamers 2015). In eastern Europe, bear canine pendants are also known from the Upper Palaeolithic, after the Gravettian, from non-burial contexts (see **fig. 1**): Gintsy, Mezhirich, Anetovka II (Ukraine) as well as Khotylevo 2 and Avdeevo (Russia). Their total number only just exceeds ten pieces (Gavrilov et al. 2013; Khlopachev 2018). However, no bear tooth pendants are known from the Urals region.

Thus, a very small number of bear tooth pendants is characteristic for the whole of Europe after the Gravettian. It may also indicate the absence of specialized bear hunting, regarding the moderate quantity of bear osseous remains at the sites in general.

Holocene: Rock Art and Portable Art

The creation and re-creation of rock art and other activities performed nearby are recognized as something collective, or communal. The latter hypothesis is mainly based on a structuralist approach, and it is argued that the main theme of rock art was mythology (Zhulnikov/Kashina 2010). In the Scandinavian Neolithic, petroglyphs with bear images appear only rarely; they may be found, for instance, as a separate image or in scenes of winter hunting, of a female bear with a cub, and of a bear chasing an elk (Helskog 2012).

Around 30 bear images appear in north-western Russian petroglyphs (Lake Onega and Vyg River, Republic of Karelia; Lake Kanozero, Murmansk Region; see **fig. 1**), which are dated to the Neolithic period but in a slightly different chronological range for each cluster. Bear image compositions in Russia are similar to the Scandinavian ones. The representation of a bear hunt is sometimes shown in connection with a bear's den, and the hunters are armed with spear or bow and arrow, or are throwing a harpoon from a boat (**fig. 5**). Thus, the bear hunt was reflected in north-eastern European petroglyphs either as a narrative (chasing on snow, attacking) or as a »frozen image« of an animal hit by a weapon. The majority of the solitary figures are difficult to interpret as a part of a particular composition or narrative. Perhaps the hunting luck of certain mythical heroes was expressed.

When we recall the bear bone statistics at the Mid-Holocene settlements in which elk, marten and wild boar dominate, then the bear hunt in rock art looks more like an extraordinary/rare theme, and the total amount of bear figures is very small. Meanwhile, distinct rock art scenes of marten and wild boar hunting are unknown, and elk hunting scenes are equally rare: for Scandinavia and north-western Russia, 17 images show bear hunting and 16 show elk hunting (Kolpakov 2020).

Fig. 5 Bear hunting scene from Lake Kanozero, Kamennyi Island, Murmansk region. – (After Kolpakov/Shumkin 2012, reproduced with permission).

The portable art of the East European Holocene forest zone is believed to be connected with personal matters and probably even with particular individuals. This applies especially for pendants worn on clothes and/or the body (Zhulnikov/Kashina 2010). As already mentioned, the economic role of the brown bear increases in the Holocene. Nonetheless, bear representations in portable art are known only in the form of the rare western European Mesolithic amber sculptures found mainly in Denmark and Poland (Kabaciński et al. 2011, 152. 162; Groß/Vang Pedersen 2023). According to Groß/Vang Pedersen (2023), these could as well belong to the Late Palaeolithic or Neolithic, while we think they may not date back to the Stone Age at all. Figurines from Denmark, Norway and Poland are all occasional finds and are very different to each other, and, until now, no similar sculptures have been found at any Stone Age settlement/burial context in the Baltic area. So it is extremely hard to specify the chronological position of the bear figurines from Denmark, Norway and Poland. We simply do not know the hunter-gatherer contexts of bear effigies or rock art images in central Europe.

In eastern Europe, the earliest and rare pieces of portable art representing animals are dated closer to the end of Boreal period and later (sites of the Yaroslavl region, Russia, 6600–6200 cal BC; Zhilin 2021, 67). The largest Mesolithic series of portable art (carved bone and antler sculptures of humans, elks and snakes [14 pieces in total]) are known from the famous Final Mesolithic Yuzhniy Oleniy Ostrov burial ground, dated to 6200–6000 cal BC (Republic of Karelia, Russia; Gurina 1956; Schulting et al. 2022). The only probable bear image – though its interpretation is questioned – is dated to the turn from the Mesolithic to the Neolithic. It comes from the Sise site (around 5500 cal BC, Latvia) and takes the form of an animal head at the top of an antler tool (Zagorska et al. 2021, fig. 4, 5).

As for the Neolithic (6000–3000 cal BC) of the East European forest zone, the bear image is totally absent in portable art until its latest phase (the second half of the 4th millennium BC), when a number of sporadic finds appear, such as bone, flint and amber pendants, wooden ladles, and a bone spoon and spatula. Their total number is 12, which is much less than the number of other zoomorphic (especially birds) and human images on portable art in general (**fig. 6**; see Kashina/Khramtsova 2023).

So-called figural axes and maces were made of stone with the use of retouching, pecking, drilling and polishing techniques. They are interpreted as ritual weaponry, deposited as offerings or for other ritual purposes, and more than 50 pieces were detected in the extended research area, including coastal Sweden, Finland, north-western and northern Russia. These items mainly date back to the 3rd millennium BC (Mantere/Kashina 2022). As already mentioned, the population of the northern latitudes of Europe retained the hunter-gatherer way of life in the Bronze Age (this is especially true for continental Russia). These archaeological finds will probably give us some hint as to how to explain the brown bear's changing place in the spiritual life of these Holocene hunters.

There is a concentration of these curious and always occasional finds in South Karelia. More than half of them represent heads of brown bears (**fig. 7**), the remaining ones show elk heads, phallic images and some indeterminate zoomorphic ones. In a recent study (Mantere/Kashina 2022) it is argued that the influence of the first herders' migration (Corded Ware and Globular Amphorae/Fatyanovo communities; see Nordqvist/Heyd 2020) to the taiga regions was obviously selective, and many areas were not suitable, partially or entirely, for the newcomers' lifestyle. So, in some northern regions we can see only slight changes in the material culture, mostly in ceramic types and in the sporadic presence of locally-made battle axes, which are rare stray finds. The same happened with areas settled by hunter-gatherers in Estonia, in the Leningrad region, and also in northern Belarus, though the presence of the Corded Ware culture there was more influential, probably due to more favorable herding conditions (Charniauski 2016; Kriiska/Nordqvist 2021).

The ritual stone weaponry of the North, including weapons with bear heads, seemingly combined the form, technology and raw material of the typical

Fig. 6 Portable art from the East European Plain forest zone depicting brown bears, dated to the turn from the Stone to the Bronze Age. **1**; **3** Usvyaty IV, Pskov region. – **2** Sarnate, Latvia. – **4** Abora I, Latvia. – **5** Imerka VIII, Republic of Mordovia. – **6** Chornaya Gora, Ryazan region. – **7** Tamula I, Estonia. – (Photos 1–4. 7 E. Kashina; 5 A. Korolev; 6 A. Macāne [reproduced with permission]).

Fig. 7 Stone axes with bear heads from the East European Plain forest zone, dated to the Early Bronze Age. **1** Nyashabozh, Komi Republic. – **2** Volgo, Tver region. – **3** Beryozovo 29, Republic of Karelia. – (Photos 1–2 I. Seden'kov, courtesy State Historical Museum, Moscow; 3 M. Shakhnovich, reproduced with permission).

herders' »battle axes« (normally observed in burials), while the modelling/style of the 4th-millennium BC animal heads was retained. This is clearly visible when comparing the stone axes with elk heads and the Mesolithic/Neolithic antler staffs with elk heads (Mantere/Kashina 2020). Thus, the predominance of bear over elk in portable art can be recognized for the Early Bronze Age in the eastern European taiga. The reason for this lies hypothetically in the herders' attitude to the brown bear, which probably became extremely harmful to their livestock. Moreover, the literal connection of the bear image with the number-one male ritual weapon points to the rise/development of such notions as martial prowess and masculinity. Though it is not possible to propose a general rise of warlike clashes in the eastern European Early Bronze Age in comparison with the Neolithic from the burial finds, maybe at least the competition for livestock increased between communities. In this case, the image of »bear the livestock killer« could have been even more relevant (Mantere/Kashina 2022).

Early/Mid-Holocene Brown Bear Osseous Remains: Pendants and Burials

During the Upper Palaeolithic as well as the eastern European Mesolithic/Neolithic, humans were utilising bear canines. Finds are known from Mesolithic and later open-air sites and burials (Koltsov 1989). Carved notches or circular incisions at the root of a tooth, used for fastening the canine to clothes, shrouds or other soft organic materials and items, are more typical in general for the Mesolithic than for the Neolithic, when drilled holes were made much more often with the same aim. This diversity of canine root modification was observed among burial finds, though these pendants were obviously worn in everyday life, too. The richest settlement/burial materials with such finds belong to the second half of the 4th millennium BC, and they include not only bear canine pendants, but also bear molars. Modified bear remains, mostly canines, were found in 74 graves, dated from the Final Mesolithic (6200 cal BC) up to the beginning of the 3rd millennium BC. However, the majority of them belong to the 4th/beginning of the 3rd millennium BC (Macāne 2022, 120; Kashina/Khramtsova 2023). Thus, we can see a kind of a paradox: while the brown bear image occurred very rarely in sculpture and rock art in comparison with other animal and human images, the use of its canines as pendants was quite common among the forest hunter-gatherer-fishers.

Nevertheless, a rareness of baculum finds both in settlement and funeral contexts can be observed. The probable connection of these bones mainly with adult male burials is visible at the Lake Baikal Early Neolithic burial ground of Shamanka II (Losey et al. 2013, 86). In eastern Europe, only one burial with a bear baculum is known so far – the Early Neolithic burial 3 at the Kubenino settlement, northern Russia, which is also that of an adult male (Kashina et al. 2021). The presence of several unmodified and modified (into an awl) baculum bones among the settlement materials of late hunter-gatherer-fishers of the second half of the 4th millennium BC in central Russia (see **fig. 3**) has a parallel in the already mentioned Shamanka II burial ground, where a sharpened baculum (an awl) was found in grave 28, and nine more pieces found at this cemetery had either traces of use, or polishing, or (one piece) a circular incision on the surface (Losey et al. 2013, 86).

Another phenomenon of the eastern European Mid-Holocene forest zone is the presence of variously-sized cemeteries, situated near or within multi-period settlements. The majority of interments are represented by single graves, but collective burials also exist. The prevailing body position is stretched supine, although the placement of the deceased in a range of other positions – stretched prone, (semi-)flexed supine, or on one side – as well as the practice of post-mortem manipulation, such as body wrapping, excarnation, the disarticulation of particular body parts, and body dismemberment were also common. The presence of unmodified bear remains, either in graves or in their close vicinity, was studied in detail using field documentation and publications (Khramtsova 2022). Bear jaws and metacarpals (both the most frequent finds) as well as teeth, skulls and phalanges were placed in or near 34 burials, while other skeletal bear parts were rare. Bear skulls and articulated paw bones were occasionally found near the graves, often in association with concentrations of burnt artefacts covered by bear paws (Kashina/Khramtsova 2023).

The presence of unmodified bear bones in these eastern European Mid-Holocene burials obviously indicates some sort of important role of the bear in ritual and funeral contexts as well as some particularly valuable qualities and properties of the bear (Macāne 2022, 112–120). The skeletal parts that were found cannot be interpreted as meat parts, but in some cases they could have been attached to bear skins, which were probably used as funeral shrouds.

Discussion

After looking through the extremely long history of bears and humans in the deep past, some questions arise that require more attention. Usually, descriptions of the Siberian rites connected with the brown bear and, most commonly, the so-called bear festivals[2] follow the description of Stone Age archaeological finds, so *de facto* ethnographical data are used as analogies for the archaeological data in the papers of Germonpré/Hämäläinen (2007), Losey et al. (2013) and Schmölcke et al. (2017). One contribution, however, places ethnography first, before archaeology is introduced (Münzel et al. 2021). Some scholars rightly criticize this approach (De Swart 2004, 126), arguing that the extrapolation of ethnographic data does not look convincing, mostly because of the huge distance in time and space between the periods under question, which feature different ecologies and economics. Also, the proposed theories (such as, for example, the purpose of Upper Palaeolithic cave art) are usually based on data from only one cave, or one region, and lead to a huge generalisation, which sometimes even connects data from different continents.

For the Upper Palaeolithic, either western or eastern European, the problem of accurate dating is always prominent. For the cave sites in particular, the problems of methodology and cultural heritage preservation caused by occasional finders and vandalism are also essential. After the Aurignacian, a well-known unity of material culture can be traced along the vast, cold steppes of Europe. Both bear hunting and bear bone/tooth modification have become widespread since that epoch. However, cases of cave bear skull »exhibition« in western/central Europe and the Urals demonstrate very different chronologies – the Middle/Early Upper Palaeolithic and the Final Upper Palaeolithic, respectively.

At present, the meaning of the brown bear for Upper Palaeolithic humans is impossible to decipher entirely. Most probably, it was not among the central spiritual figures of Europe, such as the mammoth, horse, bison, and »venus«. It was not a constant prey either.

In the course of the Early/Mid-Holocene the ways in which material and cultural development took place in Europe varied greatly: herding and agriculture came to western and central Europe much earlier than to eastern Europe and Scandinavia, obviously because of the climatic conditions. The eastern European and Scandinavian hunter-gatherer-fisher way of life was changing over time, turning generally to the known degree of sedentism in the second half of the 4th millennium BC and later. For the East European Holocene forest zone, the history of human-bear relations looks more dynamic thanks to the much larger data corpus. The sporadic presence of brown bear images in rock art and the almost total absence of it in portable art is documented by a significant corpus of finds. The antagonism between »art« and practical/economic use can be demonstrated quite explicitly. We would like to explain it in this way: while elk and swan most probably had the central spiritual role and a group of smaller mammals, snakes and waterfowl likely represented the totemic ancestors implemented in pendants (Kashina/Emelyanov 2020), the brown bear was more a special and spiritually tabooed »invisible« creature, maybe relevant mainly for the realm of death. Nevertheless, the sporadic and multi-temporal/multi-regional Holocene data allow us to propose bear image connections: 1) with burials and burial grounds (Final Mesolithic, Karelia, and Final Neolithic, central Russia), and 2) with adult men (Early Neolithic burial contexts, northern Russia and Baikal).

The bear profoundly entered north European forest portable art on the turn from the Stone to the Bronze Age. The stone hammer-axes and wooden ladles are generally »constructed« as if an unusual pommel (a bear head) was attached to an already well-known object, which as a result looks quite unnatural, especially in the case of two wooden ladles (**fig. 6, 1-2**). This major shift could be explained as the strengthening of the bear's role and a decrease of the elk image (and its role).

Of course, these explanations are not final. Some other taiga/mixed forest animals, including those recognized as economically important/tasty, are absent in art; for example, the wild boar cannot be found among the portable or rock art images of the Early/Mid-Holocene, though it constituted a good part of the hunting prey according to its percentage in the settlements' osseous remains. This brings us back to the notion that the economic significance of an animal did not automatically make it an archaeologically visible object of worship and reproduction and, *vice versa*, economically insignificant species may not have been neglected in art and beliefs.

What was the bear's use for the Upper Palaeolithic cold steppe foragers and the Holocene hunter-gatherer-fishers in general? According to the ar-

2 eloka-arctic.org/bears/bear-festivals (ELOKA: Exchange for Local Observations and Knowledge of the Arctic; accessed 27.8.2025).

chaeological data, it was definitely meat and skin. Its place in the spirituality and in the semiotic system of both eras obviously had the same connotations, judging by the uses of particular bear bones (canines, skull, baculum). Due to the patchy state of research concerning the art, especially in view of the Upper Palaeolithic, it is necessary to be very careful in drawing conclusions.

Conclusions

After observing the human-bear interaction of the Upper Palaeolithic, Mesolithic, Neolithic and Early Bronze Age, concentrating mainly on the eastern European data, we have made an attempt to create a short (and probably incomplete) review of all the collected data in order to compare the human attitude to bears in the Late Pleistocene and the Early/Mid-Holocene. The archaeological finds can be connected with: 1) profane matters (butchering, bone tool carving), 2) matters of a yet unknown/non-deciphered purpose (exhibition of bones, selection of »special« bones, e. g. canines or baculum bones), and 3) clear spiritual matters (tooth pendants, cave art, open-air rock art, and portable art).

Both cave and brown bear were hunted in the Late Pleistocene but not as extensively as, for example, the large ungulates. In the Holocene, there was a notable increase in brown bear hunting. During both eras, bear bones were modified into tools and personal ornaments, and intentional manipulations of unmodified bear bones were extensively recorded for the Late Pleistocene, whereas they are rarely met in Holocene burials. The making of tooth pendants was characteristic for both eras in eastern Europe, but the use of bear canines was far more limited in the Upper Palaeolithic than in the Mesolithic and Neolithic, probably because of the differences in bear population size (?). The limited presence of bear images in cave paintings, engravings and portable art of the Upper Palaeolithic had a partial parallel in the north-eastern European Holocene. There, bears are rarely represented in rock art and completely lacking in portable art, in the authors' point of view, until the turn from the 4th to the 3rd millennium BC, when a rapid rise in bear depictions can be observed. This could be hypothetically interpreted as the impact of the worldview of herding communities on the spirituality of the forest hunter-gatherer-fishers.

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Bibliography

Andreeva 1974a: E. G. Andreeva, Фауна древней стоянки Чёрная Гора. Архив отдела археологических памятников сектора А Государственного исторического музея [Report, State Historical Museum Moscow, folder 78, file 103, 1974].

1974b: E. G. Andreeva, Научный отчет о животных Владычeнской стоянки по костным остаткам из археологических раскопок 1974 года. Архив отдела археологических памятников сектора А Государственного исторического музея [Report, State Historical Museum Moscow, folder 79, file 108, 1974].

Braun/Zessin 2008: I. M. Braun / W. Zessin, Paläolithische Bärendarstellungen und Versuch einer zoologisch-ethologischen Interpretation. Ursus, Mittbl. Zoover. u. Zoo Schwerin 14(1), 2008, 19–38.

Charniauski 2016: M. M. Charniauski, Influences of the Corded Ware culture in the Belarusian Lakeland (on the ground of the Kryvina Peat-Bog Microregion). Arch. Lithuana 17, 2016, 89–99.

Dutkiewicz 2021: E. Dutkiewicz, Animal depictions in the mobile art of Central Europe. ArkeoGazte: Rev. Arqueol. – Arkeol. Aldizkaria 11, 2021, 75–111.

Fienup-Riordan 2007: A. Fienup-Riordan, Yuungnaqpiallerput / The Way We Genuinely Live (Washington 2007).

Gavrilov 1998: K. N. Gavrilov, Структура Хотылёвского верхнепалеолитического поселения. In: Kh. A. Amirkhanov (ed.), Восточный граветт (Moskva 1998) 177–190.

Gavrilov et al. 2013: K. N. Gavrilov / G. G. Boeskorov / E. N. Maschenko, Подвеска из клыка медведя из раскопок Хотылёво 2. Краткие сообщения инст. арх. 230, 2013, 275–286.

Germonpré/Hämäläinen 2007: M. Germonpré / R. Hämäläinen, Fossil Bear Bones in the Belgian Upper Palaeolithic: the Possibility of a Proto Bear-Ceremonialism. Arctic Anthr. 44(2), 2007, 1–30.

Gimranov/Kosintsev 2022: D. O. Gimranov / P. Kosintsev, Cave Bears (*Ursus spelaeus sensu lato*) of the Urals. Paleontol. Journal 56(1), 2022, 97–105.

Gimranov et al. 2021: D. O. Gimranov / P. A. Kosintsev / O. P. Bachura / M. G. Zhilin / V. G. Kotov / M. M. Rumyantsev, Малый пещерный медведь (*Ursus ex gr. savini-rossicus*) как объект охоты древнего человека. Вестник арх., антр. и этногр. 2(53), 2021, 5–14.

Groß/Vang Petersen 2023: D. Groß / P. Vang Petersen, Stone Age amber bear figurines from the Baltic Sea. In: O. Grimm (ed. in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 915–932.

Gurina 1956: N. N. Gurina, Оленеостровский могильник. In: A. Y. Bryusov (ed.), Материалы и исследования по археологии СССР 47 (Moskva, Leningrad 1956).

Helskog 2012: K. Helskog, Bears and meanings among hunter-fisher-gatherers in Northern Fennoscandia 9000–2500 BC. Cambridge Arch. Journal 22(2), 2012, 209–236.

Herva et al. 2013: V.-P. Herva / T. Mökkönen / K. Nordqvist, A Northern Neolithic? Clay work, cultivation and cultural transformations in the boreal zone of north-eastern Europe c. 5300–3000 BC. Oxford Journal Arch. 36(1), 2013, 25–41.

Hromadova 2012: B. Hromadova, К вопросу об атрибуции изображений на костёнковско-авдеевских лопаточках. Краткие сообщения инст. арх. 227, 2012, 94–102.

Kabaciński et al. 2011: J. Kabaciński / S. Hartz / T. Terberger, Elks in the early Stone Age art of the northern Lowlands. Praehist. Zeitschr. 86, 2911, 151–164.

Kashina/Emelyanov 2020: E. Kashina / A. Emelyanov, In bird we trust: bone bird pendants made by forest hunter-gatherer-fishers in the central part of the East European Plain (3500–2700 BC). In: O. Grimm (ed.), Raptor on the Fist – Falconry, its Imagery and similar Motifs throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 2 = Advanced Stud. Ancient Iconography II (Kiel, Hamburg 2020) 403–416.

Kashina/Khramtsova 2023: E. Kashina / A. Khramtsova, In the company of bears: the role and significance of the bear from the perspective of the Holocene hunter-gatherer-fishers of the East-European Plain forest zone (10th–3rd millennium BC). In: O. Grimm (ed. in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 291–312.

Kashina et al. 2021: E. Kashina / M. Ahola / K. Mannermaa, Ninety years after: New analyses and interpretations of Kubenino hunter-gatherer burials, north-western Russia (c. 5000 cal BC). Quaternary Internat. 574, 2021, 78–90.

Khlopachev 2018: G. A. Khlopachev, Образы зверя и человека в искусстве верхнего палеолита Русской равнины: культурно-хронологический контекст и особенности трактовки. Проблемы ист., филол., культ. 2, 2018, 116–135.

Khramtsova 2022: A. Khramtsova, Death in times of change. Transformation of the hunter-fisher-gatherer burial rituals between the Baltic and the Urals in the early to mid-Holocene [PhD thesis, Christian-Albrechts University, Kiel 2022].

Kolpakov 2020: E. Kolpakov, Economic activities in the petroglyphs of Fennoscandia. Quaternary Internat. 541, 2020, 63–73.

Kolpakov/Shumkin 2012: E. M. Kolpakov / V. Y. Shumkin, Petroglyphs of Kanozero (Sankt-Peterburg 2012).

Koltsov 1989: L. V. Koltsov (ed.), Мезолит СССР. Археол. СССР 11 (Moskva 1989).

Konstantinov et al. 1983: M. V. Konstantinov / V. B. Sumarokov / A. K. Filippov / N. M. Ermolova, Древнейшая скульптура Сибири. Краткие сообщения инст. арх. 173, 1983, 78–80.

Kosintsev/Plasteeva 2015: P. Kosintsev / N. Plasteeva, Palaeolithic hunting in the Urals (Russia). In: S. Sázelová / M. Novák / A. Mizerová (eds), Forgotten times and spaces: New perspectives in paleoanthropological, paleoetnological and archaeological studies (Brno 2015) 91–97.

Kotov 2012: V. G. Kotov, Палеолитическое святилище в пещере Заповедная на Южном Урале. Росс. арх. 2, 2012, 15–25.

Kriiska/Nordqvist 2021: A. Kriiska / K. Nordqvist, Estonian Corded Ware culture (2800–2000 cal BC) – Defining a regional group in the eastern Baltic. In: F. Heyd / G. Kulcsár / B. Preda-Bălănică (eds), Yamnaya Interactions: Proceedings of the International Workshop held in Helsinki, 25–26 April 2019 (Budapest 2021) 463–485.

Leonova 1994: N. B. Leonova, Field report on the excavation of the Kamennaya Balka site, Rostov region, Myasnikovskiy district, in 1994, F-1, R-1, № 11817 [Report, Archive of the Institute of Archaeology, Russian Academy of Sciences, Moscow 1994].

Losey et al. 2013: R. Losey / V. Bazaliiskii / A. R. Lieverse / A. Walters-Rist / K. Faccia / A. Weber, The bear-able likeness of being: ursine remains at the Shamanka II cemetery, Lake Baikal, Siberia. In: C. Watts (eds), Relational Archaeologies. Humans, Animals, Things (Abingdon 2013) 65–96.

Macāne 2022: A. Macāne, Stone Age companions. Humans and animals in hunter-gatherer burials in north-eastern Europe. GOTARC, Ser. B. 81 (Gothenburg 2022).

Majkić et al. 2018: A. Majkić / F. d'Errico / S. Milošević / D. Mihailović / V. Dimitrijević, Sequential incisions on a cave bear bone from the Middle Palaeolithic of Pešturina Cave, Serbia. Journal Arch. Method and Theory 25(1), 2018, 69–116.

Mantere/Kashina 2020: V. N. Mantere / E. Kashina, Elkhead staffs in Prehistoric North-Eastern Europe and North-Western Russia – signs of power and prestige? Oxford Journal Arch. 39(1), 2020, 2–18.

2022: V. N. Mantere / E. Kashina, Zoomorphic stone maces and axes in the forest zone of North-eastern Europe. Manifestations of interaction between hunter-gatherers and cattle herding groups in the 3rd millennium BC. In: H. Ranta (ed.), Oodeja Mikalle – Odes to Mika – Оды Мике. Festschr. Prof. Mika Lavento, on the occasion of his 60th birthday. MASF 10 (Helsinki 2022) 35–44.

Münzel/Conard 2004: S. C. Münzel / N. J. Conard, Cave bear hunting in Hohle Fels cave in the Ach valley of the Swabian Jura. Revue de Paléobiologie 23(2), 2004, 877–885.

Münzel et al. 2014: S. C. Münzel / F. Rivals / M. Pacher / D. Döppes / G. Rabeder / N. J. Conard / H. Bocherens, Behavioural ecology of Late Pleistocene bears (*Ursus spelaeus, Ursus ingressus*): Insight from stable isotopes (C, N, O) and tooth microwear. Quaternary Internat. 339, 2014, 148–163.

2021: S. C. Münzel / L. Giemsch / R. W. Schmitz, Sexual symbol or domestic tool? The use of bear bacula – an assessment of the archaeological and ethnographical record. In: S. Gaudzinski-Windheuser / O. Jöris (eds), The Beef behind all Possible Pasts. Tandem-Festschr. in Honour of Elaine Turner and Martin Street. Monogr. RGZM 157 (Mainz 2021) 471–484.

Nordqvist/Herva 2013: K. Nordqvist / V.-P. Herva, Copper Use, Cultural Change and Neolithization in North-Eastern Europe (c. 5500–1800 BC). European Journal Arch. 16(3), 2013, 401–432.

Nordqvist/Heyd 2020: K. Nordqvist / F. Heyd, The forgotten child of the wider Corded Ware family: Russian Fatyanovo culture in context. Proc. Prehist. Soc. 86, 2020, 65–93.

Nuzhniy 1997: D. Y. Nuzhniy, Проблема сезонної адаптації фінальнопалеолітичних мисливців на мамонтів Середнього Подніпров'я і нові епіграветські пам'ятки у басейні Трубежу. Арх. 2, 1997, 3–23.

Oshibkina 1996: S. V. Oshibkina (ed.), Неолит Северной Евразии. Археология (Moskva 1996).

Piezonka 2021: H. Piezonka, Mobility and Sedentism among Stone Age Hunter-Gatherers from the Baltic to the Barents Sea. In: J. Orschiedt / C. Liebermann / H. Stäuble / W. Schier (eds), Mesolithic or Neolithic? – Searching for the Late Hunter-Gatherers. Berlin Stud. Ancient World 72 (Berlin 2021) 245–302.

Schelinskiy 1997: V. E. Schelinskiy, Палеогеографическая среда и археологический комплекс верхнепалеолитического святилища пещеры Шульган-Таш (Каповой). In: V. G. Kotov (ed.), Пещерный палеолит Урала. Материалы международной конференции (г. Уфа, 9–15 сентября 1997 г.) (Ufa 1997) 29–38.

Schmölcke et al. 2017: U. Schmölcke / D. Groß / E. Nikulina, Bears and beavers: »The Browns« in daily life and spiritual world. In: B. V. Eriksen / A. Abegg-Wigg / R. Bleile / U. Ickerodt (eds), Interaction without Borders. Exemplary Archaeological Research at the Beginning of the 21st Century (Kiel, Hamburg 2017) 901–916.

Schulting et al. 2022: R. J. Schulting / K. Mannermaa / P. E. Tarasov / T. Higham / C. Bronk Ramsey / V. Khartanovich / V. Moiseyev / D. Gerasimov / J. O'Shea / A. Weber, Radiocarbon dating from Yuzhniy Oleniy Ostrov cemetery reveals complex human responses to socio-ecological stress during the 8.2 ka cooling event. Nature Ecology and Evolution 6, 2022, 155–162.

Soffer 1985: O. Soffer, Patterns of intensification as seen from the Upper Palaeolithic of the Central Russian Plain. In: T. D. Price / J. A. Brown (eds), Prehistoric Hunters-Gatherers: the Emergence of Cultural Complexity (London 1985) 235–270.

Stiner 2010: M. C. Stiner, A taphonomic study of bone assemblage formation and artifact-bear associations in Yarımburgaz Cave. In: C. F. Howell / G. Arsebük / S. L. Kuhn / M. Özbaşaran / M. C. Stiner (eds), Culture and Biology at a Crossroads: The Middle Pleistocene Record of Yarimburgaz Cave (Thrace, Turkey) (Istanbul 2010) 131–166.

Stolyar 1985: A. D. Stolyar, Происхождение изобразительного искусства (Moskva 1985).

De Swart 2004: H. W. de Swart, Cave bears in Prehistoric art; a survey from the literature. In: M. Philippe (ed.), Cahiers scientifiques du Muséum d'histoire naturelle de Lyon. Hors-série, t. 2. Actes du 9e sympos. internat. sur l'ours des caverns (Lyon 2004) 121–128.

Tarasov/Nordqvist 2022: A. Tarasov / K. Nordqvist, Made for exchange: the Russian Karelian lithic industry and hunter-fisher-gatherer exchange networks in prehistoric north-eastern Europe. Antiquity 96, 2022, 34–50.

Wamers 2015: E. Wamers (ed.), Bärenkult und Schamanenzauber. Rituale früher Jäger (Regensburg 2015).

Wilczyński et al. 2015: J. Wilczyński / P. Wojtal / M. Robličková / M. Oliva, Dolní Věstonice I (Pavlovian, the Czech Republic) – results of zooarchaeological studies of the animal remains discovered on the campsite (excavation 1924–52). Quaternary Internat. 379, 2015, 58–70.

Wojtal et al. 2012: P. Wojtal / J. Wilczyński / Z. M. Bocheński / J. A. Svoboda, The scene of spectacular feasts: animal remains from Pavlov I south-east, the Czech Republic. Quaternary Internat. 252, 2012, 122–141.

2015: P. Wojtal / J. Wilczyński / A. Nadachowski / S. C. Münzel, Gravettian hunting and exploitation of bears in Central Europe. Quaternary Internat. 359, 2015, 58–71.

Zagorska et al. 2021: I. Zagorska / L. Lõugas / H. Lübke / J. Meadows / P. Pettitt / A. Macāne / V. Bērziņš, East meets west in the 6th millennium: Mesolithic osseous tools and art from Sise on the Latvian seaboard. Praehist. Zeitschr. 96, 2021, 1–18.

Zhilin 2021: M. G. Zhilin, Изделия из кости и рога из среднего и верхнего мезолитического слоя стоянки Ивановское VII в собрании МАЭ РАН. Camera Praehist. 1, 2021, 63–100.

Zhitenev 2000: V. S. Zhitenev, Культ медведя в палеолите Европы [PhD thesis, Lomonosov State Univ., Moskva 2000].

2006: V. S. Zhitenev, Череп пещерного медведя с нарезками и следами охры из пещеры Сикияз-Тамак I (Южный Урал). In: A. P. Derevyanko / V. I. Molodin (eds), Современные проблемы археологии России: Материалы I (XVII) Всероссийского археологического съезда (23–28 октября 2006 г., Новосибирск) (Novosibirsk 2006) 201–203.

Zhulnikov/Kashina 2010: A. M. Zhulnikov / E. A. Kashina, Образ птицы в искусстве неолита-энеолита лесной зоны Восточной Европы. Росс. арх. 2, 5–17.

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Who Gets Buried with a Bear?

The Inclusion of Wild Animals in the Cremation Rite of Eastern England and Northern Germany (4th to 8th Centuries CE)

ABSTRACT

Cremation was the dominant funerary rite amongst Germanic groups on the European continent before the coming of Christianity (4th to 8th centuries CE). Likewise, it was also a prominent mortuary tradition in early medieval England (5th to 7th centuries CE). One of the most distinctive customs amongst cremation practicing groups was the provision of both domesticated and wild animal offerings at the funeral. Bear phalanges are found in a number of cremation burials in both regions. We have analysed the association between bear bones and the age and sex of the deceased, as well as relationships with pyre- and grave-goods on a site and inter-site level. We also examine other wild animals that have been identified from cremation burials, such as beaver and osprey, and discuss why these species were selected. Finally, we consider the origin of this burial rite, and the sources of these animals, as some species, for example the bear, were probably extinct in England at this time.

KEYWORDS

Cremation / funerary rites / identity / wild animals / bears / *Ursus arctos* / eastern England / northern Germany / early medieval Period / Migration Period

Introduction

The use of cremation as a mortuary rite has a rich history throughout much of Europe. Germanic groups on the continent followed this funerary practice up to the 8th century CE. Due to the influence and spread of Christianity, cremation fell out of favour and inhumation became the dominant mortuary tradition (Ludowici 2019; Steuer 2021, 611. 832–988). Northernmost Germany (Schleswig-Holstein) has yielded several sites with more than 1,000 cremation burials from the late pre-Roman Iron Age to the middle of the 1st millennium CE (c. 100 BCE to 500 CE). In contrast, only 56 inhumation burials (dating from c. 350 to 500 CE) are known from this area (Bemmann 1999; see also Abegg-Wigg 2014, on the outstanding finds from Neudorf-Bornstein). For the northern part of Germany, the bi-ritual cemeteries of Liebenau (Nienburg/Weser county, Lower Saxony; late 4th to mid-9th century CE) and Issendorf (Harsefeld, Stade county, Lower Saxony; late 4th century to 530/540 CE) are of particular importance. Liebenau is a notable site as there is surviving evidence to suggest that funerary pyres were constructed and lit in the cemetery. The cremated remains were left *in situ* at the pyre site and were subsequently covered with sand or earth. So far, Liebenau is the only site from northern Germany where this has been observed archaeologically (for further details on funeral customs at Liebenau and Ossendorf, see Häßler 2000; 2001). Cremation was also a majority rite in parts of early medieval England (5th to 7th centuries CE). This mortuary tradition had been followed in the earlier Roman period (Toynbee 1971; McKinley

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2000), though there were distinct differences in the rites conducted, for example the inclusion of domesticated and wild taxa in the early medieval period (Worley 2008, 416–417). This led Worley (2008, 411) to suggest that there was no direct continuation of the cremation rite between the Roman and early medieval periods in England, but rather a new practice had been adopted. Such a change may be attributable to the migration of Germanic groups to eastern and southern Britain who brought with them their own customs and mortuary practices (Hills 1988; Squires 2016; Gretzinger et al. 2022). Cremation was mainly practiced in this region from the 5th to 6th centuries, though it did continue as a less prominent rite into the 7th century CE (Squires 2024). During the same period the inhumation rite was also followed across eastern, south-eastern, and central England, and became more dominant over time (**fig. 1**). Despite being restricted to a more limited geographic area than the inhumation rite, many of the cremation-dominant cemeteries totalled several hundred deposits. This is evident from sites at Spong Hill (Norfolk), Cleatham (North Lincolnshire), Elsham (North Lincolnshire), and Sancton I (East Riding of Yorkshire), which are more reminiscent of the large urnfields seen on the continent than the inhumation-dominant cemeteries in England (Squires 2016).

Archaeologists have long recognised the similarities between material culture from contemporary cemeteries in England and on the continent (e. g. Myres/Southern 1973, 29; Hills 1998; Williams 2005a; Hills/Lucy 2013; Martin 2015). Many studies in the past have primarily focused on identifying artefact typology and chronology, with less attention paid to establishing connections between the urn's occupant and the associated material culture (Richards 1987). Squires (2016) identified similarities and differences between the cremation rite in early medieval England and contemporary sites in Germany. At the broadest level, cremated human bone was interred in pottery cinerary urns alongside pyre- (burned) and grave- (unburned) goods and cremated animal bone, though regional differences were apparent. Of particular interest is the mean number of cremation burials containing animal bone from early medieval England (29 %), as the figure is greater than that from Migration Period Germany (7 %) but lower than that from late Roman Iron Age Germany (74 %; see Squires 2016). While based on a relatively small sample of late Roman Iron Age cemeteries

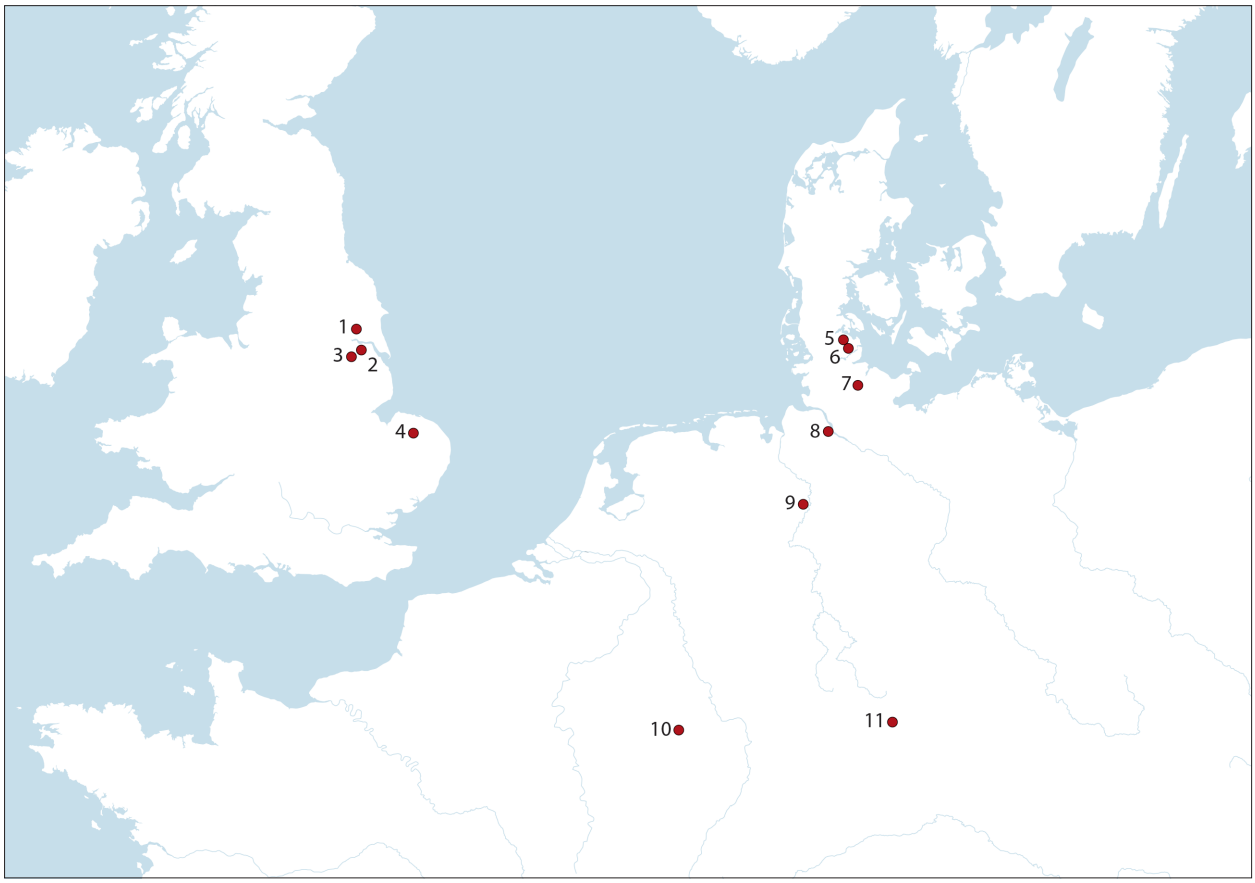

Fig. 1 Early medieval cremation-dominated cemeteries mentioned in the text. **1** Sancton. – **2** Elsham. – **3** Cleatham. – **4** Spong Hill. – **5** Süderbrarup. – **6** Sörup. – **7** Bordesholm. – **8** Issendorf. – **9** Liebenau. – **10** Schankweiler. – **11** Stettfeld. – (Map M. Bolte, LEIZA).

(n = 4), Squires' (2016) findings would suggest that the tradition of cremating and burying animal remains with humans in early medieval England originated on the continent and was introduced by migrants who continued to practice this rite. In contrast, this custom decreased in frequency in Migration Period Germany, perhaps due to changing ideological beliefs, the socio-economic implications of cremating animals, and/or shifts in the socio-political landscape (Squires 2016).

Animals domesticated for food (e. g. cattle [*Bos taurus*], sheep/goat [*Ovis/Capra*], pig [*Sus scrofa*]), companion animals (horse [*Equus caballus*], dog [*Canis familiaris*]), as well as wild animals (e. g. brown bear [*Ursus arctos*], fox [*Vulpes vulpes*], beaver [*Castor fiber*], hare [*Lepus* sp.], and birds of prey) are identified in cremated bone deposits in early medieval England (Bond 1993; 1994; 1996; Worley 2008), as well as in cremation deposits in the central northern part of Europe from the late Roman Iron Age to early medieval periods (c. 300 to 700 CE). Most examples contain only one or two cremated non-human taxa, but there is evidence to suggest that some deposits held up to four or five species (Worley 2008, 410). The quantity and provision of a range of taxa may have been related to the deceased's identity and social standing (Squires 2011). However, while the bones of animals from some sites have been studied and their inclusion in funerary customs interpreted in terms of their roles in society and cosmology (Wahl 1988a; May 1994; Schönfelder 1994; Crabtree 1995; Bond 1996; Williams 2005b; Bond/Worley 2006; Lee 2007; Pluskowski 2010; Poole 2013; 2015; Squires 2013; 2016; Beermann 2016), there is less work focussing specifically on the wild animals amongst cremation-practicing groups (exceptions include Schönfelder 1994; Bond 1996; Bond/Worley 2006; Pluskowski 2010). Of the wild fauna included in this mortuary rite, bears have received the greatest amount of attention. In England, bear remains (specifically, their phalanges) found in cremated bone deposits are always burned (**fig. 2**; see Bond/Worley 2006; O'Regan 2023), while in Germany long bone and skull fragments have also been found alongside claws, for example in grave S13/B1 from Liebenau (Häßler 1990, 38–40; May 1994, 183).

Fig. 2 Cremated bear phalanges from burial MT89BLG at Cleatham, North Lincolnshire, England. – (After Squires 2011).

In the past, explanations for the inclusion of bear remains in the cremation rite have been wide-ranging, from interpreting their presence as representing protective entities of the young in the afterlife (Meaney 1981) and other roles they held within ideological beliefs (Bond/Worley 2006), to a means of displaying mortuary identity (Pluskowski 2010) and social standing (Crabtree 1995; Pluskowski 2010). The overarching aim of this chapter is to further our understanding of the provision of wild animals, particularly bears, in early medieval cremation burials in England and northern Germany, given the similarities seen in funerary rites between the two regions. First, human demographic associations (biological age and sex) with remains of bears and other wild animals will be established to determine whether their provision was influenced by these attributes. Associations will also be drawn between the inclusion of wild animals and pyre- and grave-goods at a site and inter-site level. Secondly, we will consider why specific species were selected and included in the cremation rite. Finally, the source of these animals will be addressed to explore the reasons for their inclusion at the funeral.

The Sites

Site reports were collected for cremation and mixed-rite cemeteries of the appropriate date in England and northern Germany (**tab. 1**). The dataset for this study was then refined by determining which sites contained animal bones, and whether or not these had been analysed. If they had been analysed, the species lists were examined to establish if they contained wild taxa. After this process of elimination ten sites remained – four from eastern England and seven from northern Germany (**tab. 2**). Records of domestic dog at these sites were also collected and considered in analyses, as the dog is a companion animal, occupying a different social space to that of the wild and other domesticated animals within these assemblages (Worley 2008). Dog is included here to determine whether it yielded any patterns that were different to those of wild taxa. It must be highlighted that two German sites (Liebenau and Süderbrarup) have a broader chronological range than some of the other cemeteries examined, but

Site	Period	Animal bone present	Animal bone analysed	Wild animal bone present
Schankweiler	Roman	X	X	X
Stettfeld	Roman	X	X	
Süderbrarup	Late pre-Roman to Migration	X	X	X
Bordesholm	Migration	X		X
Gettorf	Migration	X		
Schmalstede	Migration	X		
Issendorf	Migration	X		X
Liebenau	Late Roman to early medieval	X	X	X
Soerup II	Migration	X	X	X
Quarnbek	Migration			
Sancton I	Early medieval	X	X	X
Spong Hill	Early medieval	X	X	X
Elsham	Early medieval	X		X
Cleatham	Early medieval	X		X
Mucking	Early medieval	X	X	
Newark	Early medieval	X	X	
Rayleigh	Early medieval	X	X	
Alwalton	Early medieval	X	X	
Snape	Early medieval	X	X	

Tab. 1 All cremation and mixed-rite cemeteries considered for inclusion in this study, with the presence of non-human taxa, wild or domestic, indicated where these data are available. X = present; blank cell = absent.

Site	Period	Total number of burials	Reference
Sancton I	Early medieval	90-95	Bond 1993
Elsham	Early medieval	564	Squires 2011; 2013
Cleatham	Early medieval	979	Squires 2011; 2013
Spong Hill	Early medieval	2,384	Bond 1994
Bordesholm	Migration	23	Wahl 1988a
Soerup II	Migration	33	Wahl 1988a
Schankweiler	Roman	89	Wahl 1988a; 1988b
Stettfeld*	Roman	318	Wahl/Kokabi 1988
Liebenau	Late Roman to early medieval	522	Häßler 2001
Süderbrarup	Late pre-Roman to Migration	1,234	Bantelmann 1988; Wahl 1988a
Issendorf	Migration	3,279	Caselitz 2005

Tab. 2 All 4th–7th-centuries CE cemeteries with evidence for wild animal remains and anthropological data included in this study. Note that we have used »number of burials« to indicate the size of the cemetery – this is not equivalent to the minimum number of individuals, owing to the presence of multiple burials. *Stettfeld has been included in this table due to the identification of domestic dogs. – (After Squires 2016).

the burials containing the remains of bear and other wild animals mainly belong to the period from the 4th to mid-7th century CE and are thus more or less contemporary with the finds from England (**tab. 2**). It should also be noted that the publications utilised in this research contained variable amounts of information relating to the faunal remains identified from each burial, for example at Elsham and Cleatham (Squires 2011; 2013) a comprehensive zooarchaeological assessment of the animal bone has yet to take place, whereas detailed reports have been compiled for Sancton I (Bond 1993) and Spong Hill (Bond 1994).

Where bear remains were included in multiple burials, these were excluded from statistical analysis (following Squires 2013, 161), as it is not possible to establish which human was associated with these offerings; this also applies to the examination of pyre- and grave-goods. As we were interested in general biocultural trends in connection with wild animal remains, »subadult« (0–18 years) and »adult« (19+ years) age groupings were used. The biological sex categories employed in this study (female, probable female, indeterminate, probable male, male) follow those employed by McKinley (1993; 1994) and Squires (2012). Possible sex was assigned to a number of individuals in the original publications, but these were excluded from this study; again, this was to avoid reporting inaccurate associations between sex of the deceased and animal species. Given that sex cannot be assigned to subadults using osteological methods, these individuals were excluded from any analyses that focused on the sex of the deceased and the funerary offerings they were buried with. All statistical analyses were carried out using IBM SPSS 28.

Results and Discussion

Species Selection at the Funeral

In total, 63 burials (including four multiple burials) from the cemeteries examined contained the remains of wild animals. The species observed included brown bear (n = 28; 44 %), bird (n = 21; 35 %), deer (n = 9; 14 %), fish (n = 3; 5 %), fox (n = 3; 5 %), hare (n = 3; 5 %), dog/fox/wolf (n = 2; 3 %), beaver (n = 1; 2 %), boar (n = 1; 2 %), marten (n = 1; 2 %), and oyster (n = 1; 2 %). Dog was present in 44 burials, but only co-occurred with wild taxa in three instances. Within the bird category, shelduck, osprey, unidentified raptor, and goose (which could be wild or domestic) were noted, though most birds were not recorded to taxon. **Table 3** shows a higher number of burials containing wild animal remains at sites in England than in Germany. This pattern was also observed by Squires (2016) when examining faunal remains more generally. It is interesting to note that all taxa in **table 3** were extant members of local fauna in both Germany and England, with the exception of the bear, which was extinct in England by this period (Pluskowski 2010; O'Regan 2018). In some cases, it is difficult to establish whether species were from England or overseas. For example, the marten bone mentioned in this study was recorded as *Martes* sp. Europe has more marten species than England, so it may represent an unknown taxon for England, such as the beech marten (*Martes foina*), though it could also be from the native pine marten (*Martes martes*), found in Britain from the Mesolithic onwards (Yalden 1999, 86–87). However, without further information no conclusions can be drawn about the source of these remains.

Biocultural Trends

Age Associations

The examination of these species in subadult and adult graves revealed patterns (**fig. 3**) seen elsewhere at individual cemeteries (e. g. Squires 2011). It is clear that there is a preference for the placement of bear, bird, deer, and dog in adult burials. Some species were found in low numbers and thus no clear conclusions can be drawn in such instances (e. g. beaver, boar, marten). Interestingly, Cleatham was the only site where bear remains were found with subadults (n = 3). As discussed elsewhere (e. g. Richards 1987; Squires 2011; 2014; 2016), the provision of specific faunal offerings and, indeed, pyre- and grave-goods as well as cinerary urns, may be dictated by the deceased's stage within the human lifecycle and their associated social identity and roles held within the household and wider community. In rarer cases, young individuals were buried with assemblages more akin to those of adults, including the provision of wild animals. This practice has been interpreted in different ways. Squires (2014), for instance, has suggested that social standing of individuals was influenced by their kin group. Crawford (2000), on the other hand, postulated that wealthier grave assemblages may have been the result of grieving kin

Site	No. of Burials	Bear	Beaver	Bird	Boar	Deer	Dog	Dog/Fox/ Wolf	Fish	Fox	Hare	Marten	Oyster
Cleatham	20	10	0	0	0	0	11	0	0	0	1	0	0
Elsham	11	6	0	1	0	0	4	0	0	0	0	0	0
Sancton I	5	2	0	0	0	3	3	0	0	1	0	0	0
Spong Hill	53	4	1	15	0	6	23	1	2	2	1	0	0
	England	**22**	**1**	**16**	**0**	**9**	**41**	**1**	**2**	**3**	**2**	**0**	**0**
Bordesholm	1	0	0	0	0	0	0	0	1	0	0	0	0
Issendorf	3	0	0	0	1	3	0	0	0	0	0	0	0
Liebenau	11	4	0	3	0	0	1	0	0	0	0	0	0
Stettfeld	2	0	0	0	0	0	2	0	0	0	0	0	0
Schankweiler	1	0	0	0	0	0	0	1	0	0	0	0	0
Sörup II	2	0	0	2	0	0	0	0	0	0	0	0	0
Süderbrarup	5	2	0	0	0	0	0	0	0	0	1	1	1
	Germany	**6**	**0**	**5**	**1**	**3**	**3**	**1**	**1**	**0**	**1**	**1**	**1**
	Total	**28**	**1**	**21**	**1**	**12**	**44**	**2**	**3**	**3**	**3**	**1**	**1**

Tab. 3 Number of burials from each of the sites examined in this study that contained human bone as well as remains of wild animals and domestic dog.

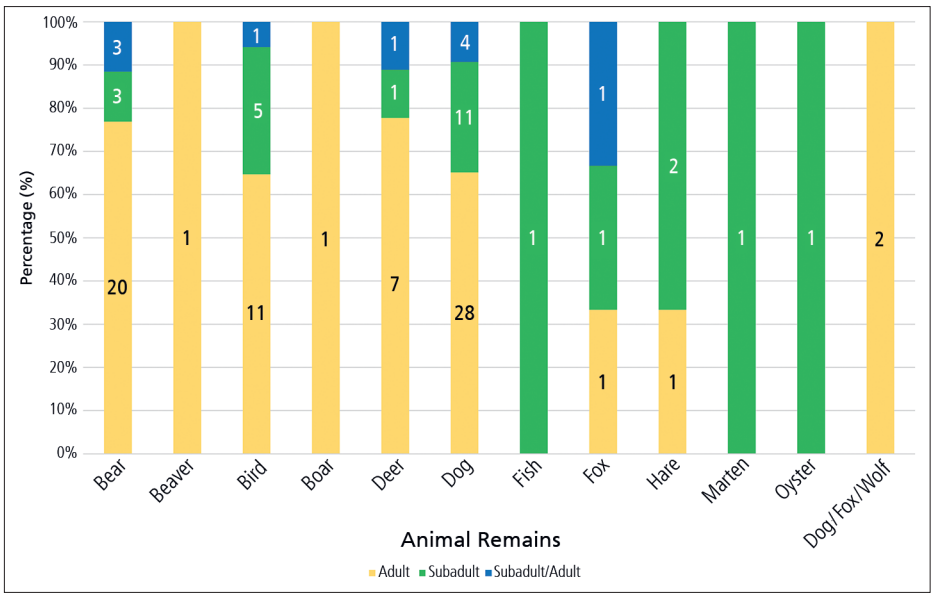

Fig. 3 Total number and percentages of wild animals and domestic dog found in the cremation burials of subadults (0–18 years), adults (19+ years), and subadults/adults (where individuals could not be assigned to a specific age category) from England and Germany. – (Graphics K. Squires).

wishing to communicate their loss, whereas Meaney (1981) has explored the amuletic meaning of the provision of certain domesticates and wild animals. In the case of Cleatham, it seems likely that these non-adults were offered bear remains at the funeral due to localised customs (see Squires 2016 for further examples and discourse around local traditions).

Sex Associations

There are several difficulties when attempting to identify sex-related trends in the cremation rite. Firstly, sexually dimorphic traits rarely survive the cremation process, so very few individuals from cremated bone deposits are assigned biological sex (this point is discussed in more depth in Squires 2012). In the present study, only a small number of individuals whose biological sex could be estimated were found with the remains of wild fauna (n = 33). Here, it must be highlighted that the total number of individuals assigned to a biological sex category excludes those from multiple burials where sex was determined, as it is not possible to ascertain which individual was associated with each funerary offering. The second difficulty is that faunal remains need to have survived and the assemblages must have been identified to species. **Figure 4** highlights the number and frequencies of wild animals and domestic dog found with humans where sex could be determined. There is a greater proportion of females than males, which is to be expected given the trend frequently observed from early medieval cremation cemeteries (see Squires 2012 for further discussion). Overall, there are no clear patterns in the data which, in

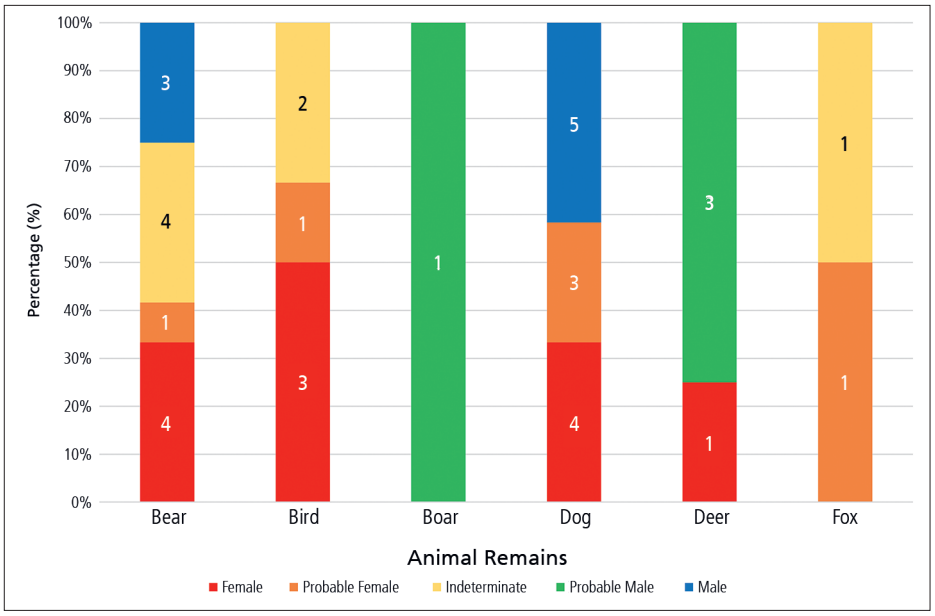

Fig. 4 Total number and percentages of wild animals and domestic dog found in the cremation burials of individuals assigned to a biological sex category. – (Graphics K. Squires).

part, may be due to the small sample sizes. Bear and bird were found in slightly higher numbers with females, whereas deer and dog were more frequently associated with males. In contrast to these results, multiple authors have stated that bears are more frequently associated with males on the continent (Holck 1986; McKinley 1994; Schönfelder 1994). On the whole, there is a relatively even proportion of wild animals in male and female burials, possibly indicating that sex was not a deciding factor when gifting fauna at the funeral. However, without increasing the sample size it is not possible to gain a true understanding of the provision of wild animals in male and female graves during this period in England and Germany.

Associations with Pyre- and Grave-goods and Domesticates

Principal Component Analysis (PCA) was carried out to establish whether there were any associations between wild animals, domesticates (e. g. horse, cattle, pig, sheep), and pyre- and grave-goods (**fig. 5**). Overall, the majority of the data cluster around the centre, though there are some outliers. Of particular interest is the relationship between deer and sheep. Deer was recorded from Spong Hill; in each case (n = 6) this taxon was found with sheep, and in four of these instances it was also associated with horse (highlighted in blue in **fig. 5**). Deer was also found with cattle and pig at the same site. McKinley (1994) noted that these combinations were not associated with biological age or sex. It thus suggests that offering multiple species may have been related to the social standing and role of an individual within a household or wider community. The provision of numerous species potentially indicates an individual of higher social standing as greater amounts of commodities were invested in the funeral.

In the past, researchers have classed bear remains as »high status« funerary offerings (Pluskowski 2010) or suggested they were possibly used for the purpose of disguise during rituals (Schönfelder 1994; Pluskowski 2010). Bear remains might thus be expected to be associated with horse and so-called high value artefacts (e. g. ivory items, brooches, bronze bowls). However, horse are only found with bear in six instances (21 %), and in the majority of cases, bear is not found with any other animal species (n = 19; 68 %). The provision of objects alongside bear is extremely variable. In some cases, the deceased are found with no pyre- or grave-goods, whilst in other instances, they are provided with combs, ivory items, glass vessels, beads, buckles, and a shield mount (artefacts most commonly associated with bear are highlighted in green in **fig. 5**). There do not appear to be any trends regarding the provision of these different artefacts and the location of the sites where they were buried. This may not only suggest local customs, but specific artefacts selected to represent the deceased's identity, social role, and position in life (Squires 2013). It is worth highlighting that associations identified through the use of PCA must be approached with caution and investigated further, e. g. fish and ivory appear together in one grave only but have formed a distinct grouping (highlighted in red in **fig. 5**).

Where Did the Animals Come from and What is Their Significance?

The sources of the animals included in the cremation rite is of clear interest. Their inclusion reveals information about trade, potential cultural origins, and the significance of the animals themselves. Taking the bear as the most prominent species, several observations can be made. Firstly, and as previously mentioned, it is highly likely that the bear was extinct in England when these cremation rites were taking place (O'Regan 2018; 2023), suggesting that bears, or their remains, must have been imported from elsewhere. The presence of bear phalanges in English cremation deposits is suggestive of skins rather than whole animals, with the implication that the skins, as opposed to whole bears, were being traded. It is worth noting that although claws could also be considered as amulets, there is no evidence in the British archaeological record of pendants made from bear remains (O'Regan 2023), and none of the documented remains are pierced for hanging. That, and the number of bones recovered from individual cremations – c. 10 in the case of MT89BLG at Cleatham (Squires 2015) and 12 from grave 402 from Süderbrarup (Wahl 1988a, 33, 118) – suggests that they originate in bear skins that formed part of the funerary assemblage. Alternatively, phalanges may have been sewn onto clothing (Mansrud 2023). The inclusion of bear phalanges on personal effects has been recorded for other cultures, for example bear claw bags were made and traded by Native Americans in the late 19th century CE (**fig. 6**). A third possibility is that the bear paw itself was important in ideological beliefs and rites. For instance, in Norway bear paws were used for healing until the early 20th century (Mansrud 2023), and there might be a line of continuity of this use at least since the Viking Age, owing to the dating of paws found beneath medieval church floors (Jahnsen 2023). It is believed that

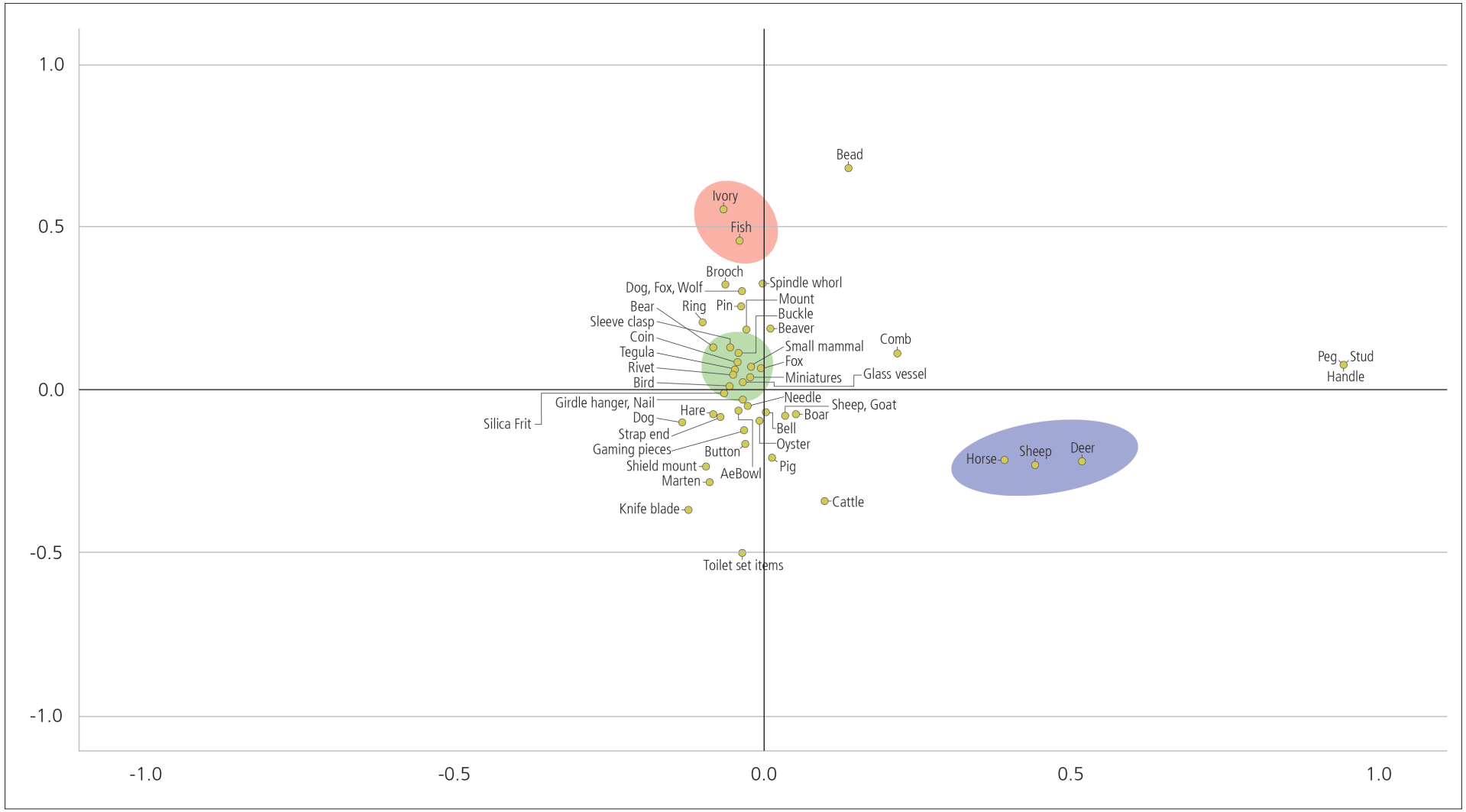

Fig. 5 Component plot of all faunal remains (wild and domesticates) and grave- and pyre-goods from burials containing wild animal remains. – (Graphics K. Squires).

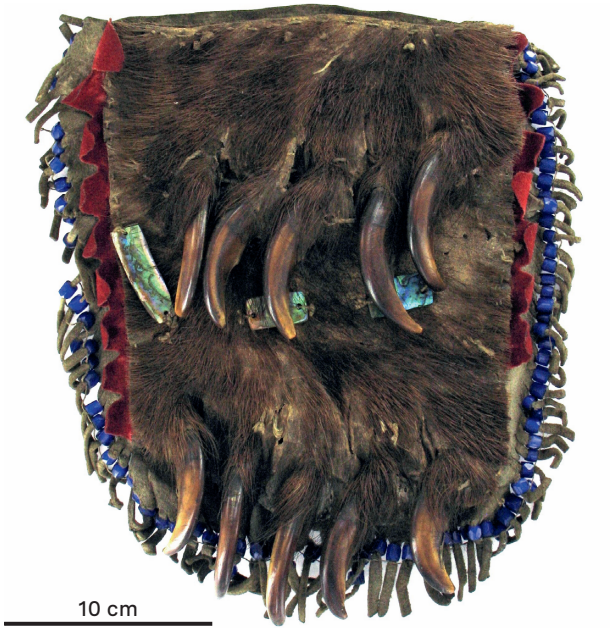

Fig. 6 A bear claw bag made and traded by Native Americans in the late 19th century CE. The leather is deer or bison, with attached bear claws. Formerly on display at Nottingham Castle Museum. – (© Nottingham City Museums & Galleries, United Kingdom).

these paws were deliberately deposited in such locations to »recharge« them for further medicinal use, but some were never recovered.

By the early medieval period, brown bears had largely been extirpated from western France (Crees et al. 2016), north-west Germany (Schmölcke 2023), and Denmark (Aaris-Sørensen 1998, cited in Price et al. 2021), but there is evidence for their presence in eastern Germany (Schmölcke 2023) and the Netherlands (Kuijper et al. 2016). The skins in German graves could have come from these latter regions, but those in England are perhaps more likely to have been traded from Scandinavia or central Europe where bear populations were larger (Albrecht et al. 2017). In Norway, 130 human cremation deposits with bear claws have been identified, dating from 1 to 575 CE (Mansrud 2023), while in Sweden, for the period 400 to 775 CE, there are 177 graves containing bear claws (largely cremation deposits, but this total also includes some inhumations; Ljungkvist/Lindholm 2023). In the Vendel period (560 to 770 CE), deposits of cremated bone contain bear and lynx claw bones, and for those sites that could be tightly dated to Vendel periods 1–3 (560 to 710 CE), 15 out of 61 (24.6 %) graves with bear remains also contained lynx remains (Ljungkvist/Lindholm 2023). Lindholm/Ljungkvist (2016, 12) suggest that owing to the paucity of brown bears in the local landscape their skins are likely to have been imported from northern Sweden, Norway, or from further east around the Baltic. To date, no lynx claws have been found in English cremation deposits, and indeed the lynx is likely to have been at very low numbers or even extinct in England by this period (Hetherington et al. 2016). There were also no lynx found in northern German deposits, thus their presence marks a clear difference between the Scandinavian deposits and those from England and northern Germany.

Dobney/Jaques (2002) surveyed the birds present at 26 early medieval sites in England, including rural, urban, and ecclesiastical locations. Neither of the two bird taxa that have been identified to species from the cremated bone deposits in the present study – osprey (*Pandion haliaetus*) and shelduck (*Tadorna tadorna*) – were identified at any of the non-burial locations examined by them (Dobney/Jacques 2002). The partially preserved osprey talon and shelduck distal radius were found in the same cremation (EL75OK) at Elsham (Squires 2015). This deposit contained the skeletal remains of an unsexed adolescent alongside a number of other items, including glass beads and ivory fragments (Squires 2015). While the role of hunting with raptors in early medieval society has been widely discussed (e. g. Dobney/Jaques 2002; Pluskowski 2010; see also numerous contributions in Gersmann/Grimm 2018 and Grimm 2020), osprey was not, and is not, used in falconry because they feed on fish and thus did not attract the attention of falconers who wanted to witness the raptor's flight and catch. The identified species are all are related to water, and both the osprey and shelduck are migratory in England. In the present day, shelduck directly link northern Germany and England, as the British shelduck population migrates to the Wadden Sea to moult in late summer prior to returning to Britain in the autumn (Cramp 1977, 458). Unidentified raptor claws have also been identified in cremations, for example at Spong Hill, where two deposits contained single phalanges that have been pierced for suspension, possibly as amulets or pendants (McKinley 1994).

Animal bone and deer antler combs are known from cremation burials in England, northern Germany, and Jutland (Williams 2003; Ashby et al. 2015). While combs are often associated with personal care, it is also thought that they served as a form of remembrance of the dead (Williams 2003). Alongside worked deer antler, unworked antler fragments of red and roe deer (*Cervus elephus* and *Capreolus capreolus*) have also been found in cremated bone deposits from England; however, their significance remains unclear (Bond/Worley 2006; Worley 2008). The antler remains from the cemetery in Issendorf are yet to be analysed (Weber 2000, 82). Given the number of combs that were made from bone or antler in this

period (e. g. West 1985; Ashby 2014; Williams 2016), it appears that deer were present in more cremations in the form of completed »products« than they were as raw materials (Poole 2013). This suggestion is supported by the only identified non-antler roe deer artefact – an inscribed astragalus interpreted as a gaming piece – from a deposit of burned bone from the cremation-dominant cemetery of Caistor-by-Norwich in Norfolk (Worley 2008, 389). It is perhaps unlikely that unworked antler had the same significance as the combs, but this is an area that could prove interesting for further research.

The distribution of beaver remains is also noteworthy, as so far they have only been identified in cremated bone deposits from England, despite the animal also being present on the continent. Crees et al. (2016) identified beaver remains at archaeological sites throughout northern Germany, indicating that beaver might be expected to be available for those providing funerary offerings, but on the basis of the current evidence this animal does not appear to have been used in mortuary rites. However, Coles (2006) makes the important point that beaver products such as castoreum or skins do not contain bones, so unless their limbs were dried for meat their presence is likely to be invisible on many archaeological sites. The same author notes the presence of a beaver skin bag at Sutton Hoo (Suffolk) as an example of what may have been present elsewhere at the time of burial (Coles 2006, 133–134). In England, the majority of early medieval beaver finds are incisors from inhumation burials of children and younger women (where sex could be identified; see Coles 2006, 132). It has been suggested that the teeth may have been used as talismans or simply pendants and that they could relate to teething, pregnancy, or fertility (Meaney 1981; Coles 2006, 133). As yet, no beaver incisors have been found in deposits of cremated bones. A distal humerus belonging to a beaver was recovered from Spong Hill (Bond 1996), which is perhaps more likely to have been a food offering than having a deeper significance (Coles 2006). As beavers were present in England at the time, and are particularly likely to have been present in the fenlands south of Spong Hill, this humerus probably represents a local animal rather than an import.

Other wild taxa that are documented but rarely found include fox, hare, fish, marten, and oyster. The presence of foxes and dogs in the cremation rite has been discussed by Bond/Worley (2006), who suggested there may be some (unknown) significance in the finding of both fox and bear remains in cremation MS202 at Sancton I, and in cremation 2890 at Spong Hill. Fish are found in two deposits from Spong Hill and in one burial at Bordesholm. The remains from Spong Hill were single vertebrae from unknown species (Bond 1994), making further interpretation difficult. A single marten metatarsal of unknown species (*Martes* sp.) was found at Süderbrarup (Wahl 1988a, 117–118), and is perhaps most likely to represent a skin or perhaps an item of clothing that was incorporated into the cremation rite. Hare bones have been found at Spong Hill, Cleatham, and Süderbrarup. The single hare tibia found at Süderbrarup had been worked, possibly to form a bead (Wahl 1988a, 118), while the bone from Spong Hill was a humerus fragment with no sign of butchering (Worley 2008), and the remains from Cleatham were only identified as »?hare«; interestingly, all were from a single child's burial (MT85GR; Squires 2015). Hare remains could be indicative of hunting, such as with dogs or birds of prey (Dobney/Jaques 2002), and/or they may indicate a food offering (Worley 2008), but with only three examples to consider there may not be a unifying reason for inclusion across the sites. A single find of an oyster shell at Süderbrarup is also difficult to interpret (Wahl 1988a, 118), as it may represent food remains or could even be residual within the soil.

Based on the analyses presented in this chapter, bears, birds, deer, fish, and hare have all been found in cremated bone deposits in both England and northern Germany. As mentioned above, we can say very little about the fish or hare, and the category of birds includes different species, from domesticated goose to wild osprey, that may have had very different cultural meanings. Therefore, given the more frequent inclusion of unworked deer antler and bear remains at the funeral, it would appear that these species held particular importance to cremation-practicing groups. A key question is which parts of deer are present at Issendorf, to determine if the pattern of unworked deer antler is the same as that seen in England. However, analysis of the finds from Issendorf has yet to be carried out (Weber 2000, 82). The distribution of bear remains at most sites in England and Germany supports the idea that bears demonstrate a cultural link between the two regions. Given that bear remains appear in cremated bone deposits regardless of the provision of pyre- and grave-goods, it would not appear that social standing alone is the reason for their inclusion. A similar conclusion was also reached by Mansrud (2023) and Strehlau (2023) with regards to the incorporation of bear remains in cremation deposits in Norway and Uppland in Sweden – some graves with bear remains had almost no other grave goods while others appeared to have high status furnishings. Strehlau (2023) suggests that the inclusion of bear remains may mark a social grouping, as males, females, and children all received them.

Concluding Remarks and Recommendations for Further Work

While the inclusion of wild animals in deposits of cremated bone dating to the 4th to 7th centuries CE is a rarity, these remains are important as they can provide a wealth of information about grave provision type (e. g. unprocessed [deer antler] versus processed [bear skins, antler combs]) materials and their sources, as well as the identity of the deceased human they were gifted to.

It is clear that more zooarchaeological work is needed from both England and Germany, a call that was made over 25 years ago by Hills (1998) but has still not been heeded. Such analyses will offer a more comprehensive understanding of faunal offerings in the cremation rite and human-animal interactions, through increasing sample sizes, and further elucidating similarities and differences between the two populations. Zooarchaeological analysis has yet to be conducted for 18 cremated bone deposits from Issendorf; these were excavated in 1967–1979 but, at present, the only published details of the faunal remains mention the inclusion of charred horse teeth in one burial and unspecified antler remains from three interments (Weber 2000, 82). There is also the potential for comparing the deposits discussed here with those from Scandinavia; however, these deposits also need full osteological analysis as most are still sexed by grave goods (Strehlau 2023; Ljungkvist/Lindholm 2023). The development of osteological methods over the past twenty years now allows bioarchaeologists to untap previously unknown information about individuals offered the cremation rite. It is hoped that recent advances within the discipline of burned bone studies will attract more zooarchaeologists to analyse and interpret cremated faunal offerings from northern Europe.

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Bibliography

Aaris-Sørensen 1998: K. Aaris-Sørensen, Danmarks forhistoriske dyreverden (Copenhagen 1998).

Abegg-Wigg 2014: A. Abegg-Wigg, Die Grabkammern aus Holz der Römischen Kaiserzeit von Neudorf-Bornstein. In: A. Abegg-Wigg / N. Lau (eds), Kammergräber im Barbaricum. Zu Einflüssen und Übergangsphänomenen von der vorrömischen Eisenzeit bis in die Völkerwanderungszeit. Schr. Mus. Arch. Schloss Gottorf, Ergr. 9 (Neumünster, Hamburg 2014) 105–122.

Albrecht et al. 2017: J. Albrecht / K. A. Barton / N. Selva / R. S. Sommer / J. E. Swenson / R. Bischof, Humans and climate change drove the Holocene decline of the brown bear. Scientific Reports 7, 2017: 10399. DOI: 10.1038/s41598-017-10772-6.

Ashby 2014: S. Ashby, Technologies of appearance: hair behaviour in early medieval Europe. Arch. Journal 171, 2014, 151–184.

Ashby et al. 2015: S. Ashby / P. Steven / A. N. Coutu / S. M. Sindbæk, Urban Networks and Arctic Outlands: Craft Specialists and Reindeer Antler in Viking Towns. European Journal Arch. 18, 2015, 679–704.

Bantelmann 1988: N. Bantelmann, Süderbrarup. Ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln. I: Archäologische Untersuchungen. Offa-Bücher 63 (Neumünster 1988).

Beermann 2016: S. Beermann, Bärenkrallen und Bärenfelle in Brand- und Körpergräbern der vorrömischen Eisenzeit bis Völkerwanderungszeit in Mittel- und Nordeuropa. Univforsch. Prähist. Arch. 279 (Bonn 2016).

Bemmann 1999: J. Bemmann, Körpergräber der Jüngeren Römischen Kaiserzeit und Völkerwanderungszeit aus Schleswig-Holstein. Zum Aufkommen einer neuen Bestattungssitte im überregionalen Vergleich. In: H.-J. Häßler (ed.), Die Altsachsen im Spiegel der nationalen und internationalen Forschung. Neue Forschungsergebnisse. Stud. Sachsenforsch. 13 (Oldenburg 1999) 5–45.

Bond 1993: J. M. Bond, Cremated animal bone. In: J. Timby, Sancton I. Anglo-Saxon Cemetery Excavations Carried Out Between 1976 and 1980. Arch. Journal 150, 1993, 300–308.

1994: J. M. Bond, Appendix I: the cremated animal bone. In: J. I. McKinley (ed.), The Anglo-Saxon Cemete-

ry at Spong Hill, North Elmham Part VIII: The Cremations. Anglian Arch. Report 69 (Dereham 1994) 121–135.

1996: J. M. Bond, Burnt offerings: animal bone in Anglo-Saxon cremations. World Arch. 28(1), 1996, 76–88.

Bond/Worley 2006: J. M. Bond / F. L. Worley, Companions in death: the roles of animals in Anglo-Saxon and Viking cremation rituals in Britain. In: R. Gowland / C. Knüsel (eds), Social Archaeology of Funerary Remains (Oxford 2006) 89–98.

Caselitz 2005: P. Caselitz, Die Menschen von Issendorf: Rekonstruktion einer altsächsischen Gemeinschaft. Stud. Sachsenforsch. 9, 6 (Oldenburg 2005).

Coles 2006: B. Coles, Beavers in Britain's Past. WARP Occ. Paper 19 (Oxford 2006).

Crabtree 1995: P. J. Crabtree, The symbolic role of animals in Anglo-Saxon England: evidence from burials and cremations. In: K. Ryan / P. J. Crabtree (eds), The Symbolic Role of Animals in Archaeology (Philadelphia 1995) 20–26.

Cramp 1977: S. Cramp (ed.), Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic 1 (Oxford 1977).

Crawford 2000: S. Crawford, Children, grave goods and social status in early Anglo-Saxon England. In: J. Sofaer Derevenski (ed.), Children and Material Culture (London, New York 2000) 169–179.

Crees et al. 2016: J. J. Crees / C. Carbone / R. S. Sommer / N. Benecke / S. T. Turvey, Millennial-scale faunal record reveals differential resilience of European large mammals to human impacts across the Holocene. Proc. Royal Soc., Ser. B 283, 2016, DOI: 10.1098/rspb.2015.2152.

Dobney/Jaques 2002: K. Dobney / D. Jaques, Avian signatures for identity and status in Anglo-Saxon England. Acta Zool. Cracoviensia 45, 2002, 7–21.

Gersmann/Grimm 2018: K.-H. Gersmann / O. Grimm (eds), Raptor and Human – Falconry and Bird Symbolism throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 1 (Kiel, Hamburg 2018).

Gretzinger et al. 2022: J. Gretzinger / D. Sayer / P. Justeau et al., The Anglo-Saxon migration and the formation of the early English gene pool. Nature 610, 2022, 112–119.

Grimm 2020: O. Grimm (ed., in coop. with K.-H. Gersmann and A.-L. Tropato), Raptor on the Fist – Falconry, its Imagery and Similar Motifs throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 2 = Adv. Stud. Ancient Iconography II (Kiel, Hamburg 2020).

Häßler 1990: H.-J. Häßler, Das sächische Gräberfeld bei Liebenau, Kreis Nienburg/Weser. Stud. Sachsenforsch. 5, 3 (Hildesheim 1990).

2000: H.-J. Häßler, Issendorf. In: RGA 15 (Berlin 2000) 536–539.

2001: H.-J. Häßler, Liebenau. In: RGA 18 (Berlin 2001) 348–353.

Hetherington et al. 2006: D. A. Hetherington / T. C. Lord / R. M. Jacobi, New evidence for the occurrence of Eurasian lynx (*Lynx lynx*) in medieval Britain. Journal Quaternary Scien. 21, 2006, 3–8.

Hills 1998: C. M. Hills, Did the people of Spong Hill come from Schleswig-Holstein? In: H.-J. Hässler (ed.), Die Wanderung der Angeln nach England. Stud. Sachsenforsch. 11 (Hildesheim 1998) 145–154.

Hills/Lucy 2013: C. Hills / S. Lucy, Spong Hill. Part IX: Chronology and Synthesis (Cambridge 2013).

Holck 1986: P. Holck, Cremated Bones: A Medical-Anthropological Study of Archaeological Material on Cremation Burials. Anthr. Skr. 1 (Oslo 1986).

Jahnsen 2023: J. B. Jahnsen, Bears in churches: Skin, paws, and claws in Norway. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 795–810.

Kuijper et al. 2016: W. J. Kuijper / I. K. A. Verheijen / A. Ramcharan / H. van der Plicht / Th. van Kolfschoten, One of the last wild brown bears (*Ursus arctos*) in the Netherlands (Noordwijk). Lutra 59, 2016, 49–64.

Lee 2007: C. Lee, Feasting the Dead: Food and Drink in Anglo-Saxon Burial Rituals. Anglo-Saxon Stud. 9 (Woodbridge 2007).

Lindholm/Ljungkvist 2016: K.-J. Lindholm / J. Ljungkvist, The bear in the grave: exploitation of top predator and herbivore resources in first millennium Sweden – first trends from a long-term research project. European Journal Arch. 19, 2016, 3–27.

Ljungkvist/Lindholm 2023: J. Ljungkvist / K.-J. Lindholm, Bears and the Viking Age transition in Sweden. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 387–404.

Ludowici 2019: B. Ludowici, Die neue Geschichte der alten Sachsen. In: B. Ludovici (ed.), Saxones. Eine neue Geschichte der alten Sachsen [Ausstellungskat. Hannover] (Stuttgart 2019) 31–35.

Mansrud 2023: A. Mansrud, The power of the paw. Multispecies perspectives on the bear claw burial tradition in a long-time perspective in South Norway. In: O. Grimm

(ed., in coop. with D. Groß / A. Pesch / O. Sundqvist /A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 489–532.

Martin 2015: T. F. Martin, The Cruciform Brooch and Anglo-Saxon England (Woodbridge 2015).

May 1994: E. May, Die Pferdeskelette aus den Pferdegräbern und weitere Tierknochenfunde aus dem Gräberfeld von Liebenau. In: H.-J. Häßler (ed.), Das sächsische Gräberfeld bei Liebenau, Kreis Nienburg (Weser), Teil 5. Einzelstudien und naturwissenschaftliche Untersuchungsergebnisse. Stud. Sachsenforsch. 5, 4 (Hannover 1994) 133–183.

McKinley 1993: J. I. McKinley, Cremated Bone. In: J. Timby, Sancton I. Anglo-Saxon Cemetery Excavations Carried Out Between 1976 and 1980. Arch. Journal. 150, 1993, 287–316.

1994: J. I. McKinley, The Anglo-Saxon Cemetery at Spong Hill, North Elmham Part VIII: The Cremations. East Anglian Arch. Report 69 (Dereham 1994).

2000: J. I. McKinley, Phoenix rising: aspects of cremation in Roman Britain. In: J. Pearce / M. Millett / M. Stuck, Burial, Society and Context in the Roman World (Oxford 2000) 38–44.

Meaney 1981: A. L. Meaney, Anglo-Saxon Amulets and Curing Stones. BAR British Ser. 96 (Oxford 1981).

Myres/Southern 1973: J. N. L. Myres / W. H. Southern, The Anglo-Saxon Cremation Cemetery at Sancton, East Yorkshire. Hull Mus. Publ. 218 (Hull 1973).

O'Regan 2018: H. J. O'Regan, The brown bear (*Ursus arctos*) in Holocene Britain: a review of the evidence. Mamm. Rev. 48, 2018, 229–244.

2023: H. J. O'Regan, Bears in burials and entertainment in later prehistoric to modern Britain. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 187–208.

Pluskowski 2010: A. Pluskowski, Animal Magic. In: M. Carver / A. Sanmark / S. Semple (eds), Signals of Belief in Early England: Anglo-Saxon Paganism Revisited (Oxford 2010) 103–127.

Poole 2013: K. Poole, Engendering debate: animals and identity in Anglo-Saxon England. Medieval Arch. 57, 2013, 61–82.

2015: K. Poole, Foxes and badgers in Anglo-Saxon life and landscape. Arch. Journal 172, 2015, 389–422.

Price et al. 2021: T. D. Price / L. Klassen / K.-G. Sjögren, Pitted ware culture: isotopic evidence for contact between Sweden and Denmark across the Kattegat in the Middle Neolithic, ca. 3000 BC. Journal Anthr. Arch. 61, 2021. DOI: 10.1016/j.jaa.2020.101254.

Richards 1987: J. D. Richards, The Significance of Form and Decoration of Anglo-Saxon Cremation Urns. BAR British Ser. 166 (Oxford 1987).

Schmölcke 2023: U. Schmölcke, The history of the brown bear (*Ursus arctos* L.) in the northern German lowlands. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 265–289.

Schönfelder 1994: M. Schönfelder, Bear-claws in Germanic graves. Oxford Journal Arch. 13(2), 1994, 217–227.

Squires 2011: K. E. Squires, An Osteological Analysis and Social Investigation of the Cremation Rite at the Cemeteries of Elsham and Cleatham, North Lincolnshire [PhD thesis, Univ. Sheffield 2011].

2012: K. E. Squires, Populating the pots: the demography of the early Anglo-Saxon cemeteries at Elsham and Cleatham, North Lincolnshire. Arch. Journal 169, 2012, 312–342.

2013: K. E. Squires, Piecing together identity: a social investigation of early Anglo-Saxon cremation practices. Arch. Journal 170, 2013, 154–200.

2014: K. E. Squires, Through the Flames of the Pyre: The Continuing Search for Anglo-Saxon Infants and Children. In: D. M. Hadley / K. A. Hemer (eds), Medieval Childhood: Archaeological Approaches (Oxford 2014) 114–130.

2015: K. E. Squires, An Osteological Analysis and Social Investigation of the Cremation Rite at the Cemeteries of Elsham and Cleatham, North Lincolnshire [data-set for PhD thesis, Univ. Sheffield 2011; Archaeology Data Service, York, 2015]. DOI: 10.5284/1029431.

2016: K. E. Squires, Neighbours and networks: funerary trends among cremation practicing groups in early medieval England and north-western Europe. In: I. Riddler / J. Soulet / L. Keys (eds), The Evidence of Material Culture: Studies for Professor Vera Evison (Montagnac 2016) 116–135.

2024: K. Squires, The Bioarchaeology of Early Medieval Cremations in England. In: H. Williams / F. Lippok (eds), Cremation in the Early Middle Ages (Leiden 2024) 165–176.

Steuer 2021: H. Steuer, Germanen aus Sicht der Archäologie: neue Thesen zu einem alten Thema. RGA Ergbd. 125 (Berlin 2021).

Strehlau 2023: H. Strehlau, The occurrence of *Ursus arctos* in relation to other faunal remains in burials during

the Late Iron Age (560/70–1050 CE) in Uppland Sweden. In: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 417–428.

Toynbee 1971: J. M. C. Toynbee, Death and Burial in the Roman World (Baltimore, London 1971).

Wahl 1988a: J. Wahl, Süderbrarup. Ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln II. Anthropologische Untersuchungen. Offa-Bücher 64 (Neumünster 1988).

1988b: J. Wahl, Menschenknochen. Anhang: Die Leichenbrände des Römischen Gräberfeldes von Schankweiler, Kreis Bitburg-Prüm. Trierer Zeitschr. 51, 1988, 367–422.

Wahl/Kokabi 1988: J. Wahl / M. Kokabi, Das römische Gräberfeld von Stettfeld I. Osteologische Untersuchungen der Knochenreste aus dem Gräberfeld. Forsch. u. Ber. Vor- u. Frühgesch. Baden-Württemberg 29 (Stuttgart 1988).

Weber 2000: M. Weber, Das sächsische Gräberfeld von Issendorf, Landkreis Stade. Stud. Sachsenforsch. 9.2 (Oldenburg 2000).

West 1985: S. West, West Stow: The Anglo-Saxon Village. 1: Text. East Anglian Arch. Report 24 (Ipswich 1985).

Williams 2003: H. Williams, Material culture as memory: combs and cremation in early medieval Britain. Early Medieval Europe 12, 2003, 89–128.

2005a: H. Williams, Heathen graves and Victorian Anglo-Saxonism: assessing the archaeology of John Mitchell Kemble. In: S. Semple (ed.), Anglo-Saxon Studies in Archaeology and History 13 (Oxford 2005) 1–18.

2005b: H. Williams, Animals, ashes and ancestors. In: A. Pluskowski (ed.), Just Skin and Bones? New Perspectives on Human-Animal Relations in the Historical Past (Oxford 2005) 19–40.

2016: H. Williams, Tressed for death in early Anglo-Saxon England. Internet Arch. 42. DOI: 10.11141/ia.42.6.7.

Worley 2008: F. Worley, Taken to the Grave: An Archaeozoological Approach Assessing the Role of Animals as Crematory Offerings in First Millennium AD Britain [PhD thesis, Univ. Bradford 2008].

Yalden 1999: D. Yalden, The History of British Mammals (London 1999).

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First Bear Claw Finds in Weapon Graves of the 6th/First Half of the 7th Century on the Kaliningrad Peninsula

ABSTRACT

The authors discuss the first bear claw finds from recently investigated Late Migration period cremation graves on the Kaliningrad Peninsula, the former settlement area of the West Balt tribes of the *Aestii* of historical sources.. Size and construction of the graves and composition and richness of their inventories, accompanying several horse burials, point to the high social status of the dead. Unique in the local context are numerous bear claws in the burials. Analogies in both male and female graves in Scandinavia and Central Europe are often verifiably interpreted as the remains of bear skins, while their placement in the burials probably has its origin in a Germanic warrior milieu. Most described burials contained weapons, which allow interpreting them as male warrior graves, while one belonged, according to the grave goods, to a woman. Presence of a bear skin in a grave is thus not necessarily always a reflection of warrior rituals but rather a symbol of a high social status.

KEYWORDS

West Balts / former East Prussia / Kaliningrad / Sambian Peninsula / Late Migration period / Dark Ages / *Aestii* / weapon graves / horse burials / bear claws (bear skins)

Description and Discussion of Finds

For a long time, the territory of the former German province of East Prussia was considered one of the archaeologically best-investigated regions of pre-World War II Europe. First and foremost, this assertion is true for funerary monuments, both for the whole territory of the province as well as for one of its most archaeologically rich and interesting regions: the Sambian Peninsula (historical Sambia and the present-day Kaliningrad Peninsula). The study of the peninsula in the pre-World War II research period can justifiably be called a »necropolis archaeology«: while the burial mounds of the Bronze Age and Early Iron Age attracted the attention of researchers by the very fact of their prominent presence in the landscape[1], the flat burial sites of the Roman Age – »the Late Pagan period«[2] – were famous for their numer-

1 The burial mounds were destroyed in huge numbers for many reasons: through ploughing by farmers and land owners, by treasure hunters in search of precious metals, just out of curiosity by the first »serious« archaeologists in the process of their academic investigations and, finally and probably most intensively, by stonecutters, who used the stone structures of funerary Bronze Age constructions as man-made stone deposits. In the latter case, stone elements of the burial mounds were subsequently used as paving material for roads and as construction material for bridges, viaducts and other infrastructural objects, many of which were built in the province in the 19th and early 20th centuries.

2 The term »Late Pagan Time« (German: *spätheidnische Zeit*) was widely used in local pre-World War II East Prussian archaeology and stands for the time span between the end of the Viking period and the beginning of the Teutonic Order expansion into the lands of the Old Prussians (11th–13th centuries AD). The time span in question is also referred to as phase H of the local chronology (Engel 1931, 314).

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ous, rich and characteristic grave goods[3]. Indeed, the excavations conducted by East Prussian scholars on the necropolises yielded archaeological material that formed the basis of the early typologies of local categories of finds and the chronological system of local antiquities created by the renowned East Prussian archaeologist, Otto Tischler (Tischler/Kemke 1902); the latter has generally remained valid (for the region in question as well as for some of the neighbouring European regions) until the present day.

It is evident that, in spite of the considerable amount of the, mostly high quality, research performed, it has so far only been possible to discover and investigate a relatively small number of archaeological sites, i. e. funerary complexes. The reasons for this are both the high concentration of the burial sites overall on the peninsula and their considerable sizes. Burial sites could easily remain in continuous use for a thousand years and even longer, reaching four-digit numbers of burials per site[4]. Thus, while paying tribute to the more than 150 years of archaeological investigations on the peninsula, one should consider all the limiting factors of especially the early research phase and not blindly trust previously made conclusions without proper verification. Indeed, many richly decorated luxurious archaeological objects without analogues among the pre-World War II finds have been discovered at the burial sites on the peninsula during recent years. These artefacts, whose existence in fact contradicts the previously existing hypothesis on the egalitarian structure of the *Aestii* society, shed, *inter alia*, new light on the historical and social processes that took place in Sambia in the Dark Ages.

The most interesting research questions about the history of the Kaliningrad Peninsula are those concerning the interaction of the *Aestii* (the local population, who were of predominantly Baltic origin and were direct ancestors of the medieval Old Prussians) with the Germanic peoples during the Roman Age, the Migration period, the so-called »Dark Ages« (the 6th–8th centuries AD), and the Viking Age as well as the corresponding influence of Germanic traditions on the development of the local culture on the whole and its warrior aspects in particular. The peculiarities of the warrior traditions of Central and Northern Europe in that turbulent time are known to us from several sources – archaeological, pictorial and literary (the latter in the form of epic poems and heroic sagas).

One of the most striking and widely covered manifestations of the warrior traditions of Scandinavia in the medieval and modern specialised literature is the existence of male warrior societies devoted to the pagan god of the underworld and warriors, Wotan/Odin (Von See 1961; Wamers 2009; Sturluson 2011, 10. 57–58. 67; Kirkinen 2017, 4; Sundqvist 2023). Their members are said to have chosen bears or wolves as their totem animals and symbolically wore the skins of these predators (the *berserkir* and *ulfheðnar* of the sagas, respectively). Identical or very similar traditions were widespread in the warrior milieu on the continent, as is evidenced by, *inter alia*, the steadily growing number of bear claw finds in the contemporary warrior graves in Central and Northern Europe in recent years. A high number of claw finds from the Dark Ages, i. e. the Vendel period (7th–8th centuries AD), is documented especially for Scandinavia and particularly for the burials in modern Sweden and on the island of Gotland (Beermann 2016, 44. 49. 52; Wamers 2009, 10; Lindholm/Ljungkvist 2023, 391–392). Although local archaeological material as well as some of the Old Prussian legends (Grunau 1876) that have been written down in the Middle Ages bear witness to the presence of Germanic people on the Sambian Peninsula during the Dark Ages, it has not been possible to discover any archaeological proof of the existence of cults connected with the above-mentioned warrior traditions until recently.

Taking into account the late conversion of Sambia's population to Christianity (which started only in the second half of the 13th century with the invasion of the Old Prussian lands by the Teutonic Order) and the corresponding late spread of writing, archaeological sites remain the single source of information on the Dark Ages in the region. Literary sources comparable to the heroic epic of the Germanic people of Central and Northern Europe simply do not exist (at least they are currently not known) for the territory in question.

Until recently, no archaeological finds that could testify to the existence of a bear cult on the Kaliningrad Peninsula from the Roman Age to the Dark Ages were known to scholars; even finds of amulets

3 The rich and numerous grave goods of the Sambian funerary complexes played a bad joke on the investigation of the local prehistoric settlement sites insofar as only minor attention was paid to the latter until quite recently.

4 These calculations are based on the comparative analysis of the results of pre-World War II and modern archaeological excavations (see for example Prassolow/Skvorzov 2016).

made out of single bear teeth or claws seem not to be represented in the local archaeological material[5]. At the same time, the results of the comparative analysis of descriptions of the same grave inventories in the pre-World War II period and in modern times suggest that the absence of certain finds in the old reports and specialised literature probably does not necessarily reflect the objective historical reality but merely the former quality of archeological material inspection and/or its documentation, which has been repeatedly referenced in previous publications (Prasolov 2013, 85–86; Prassolow 2013, 94–96; 2018, 128–129).

In the context of the cultural phenomenon discussed in this article, the above-described situation (the absence of bear claw finds) has changed only recently due to the large-scale archaeological excavations performed at a number of large, flat burial sites in the Zelenogradskij district (former German Kreis Fischhausen) of the Kaliningrad region of Russia. Brown bear (*Ursus arctos*) claw finds came to light in seven burials (**fig. 1**): burial complex[6] №16-25 of the

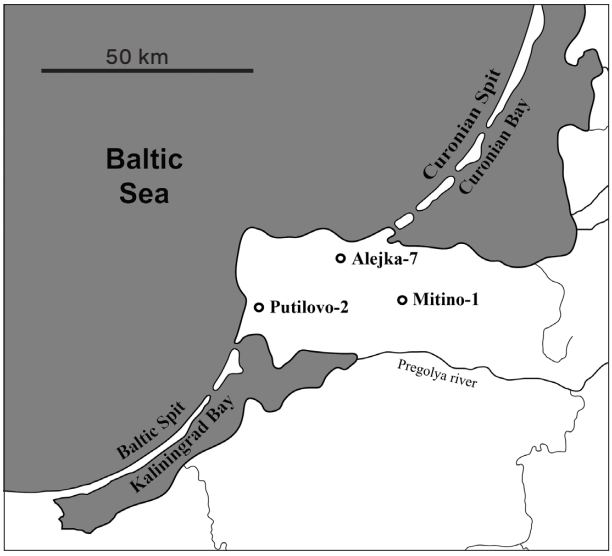

Fig. 1 Burial sites with bear claw finds on the Kaliningrad Peninsula. – (Graphics J. Prassolow).

Mitino-1 burial site (formerly Stantau; excavations in 2015), graves №258 and №X-22 of the Alejka-7 burial site (formerly Skarr Wald[?], excavations in 2016/2017), as well as in graves №444, 685, 726 and 787 at the Putilovo-2 burial site (formerly Gauten; excavations in 2021/2022; see Skvorcov 2016, as well as K. Skvorcov's personal archive, respectively).

Bear claws, i. e. first phalanges, numbering from two to 12 (12 claws were found in grave X-22 at the burial site of Alejka-7; see **fig. 2**) have so far been found in the above-listed weapon graves dated to the 6th until the beginning of the 7th century AD[7] (period E of the local antiquities' chronology after Engel 1931, 314).

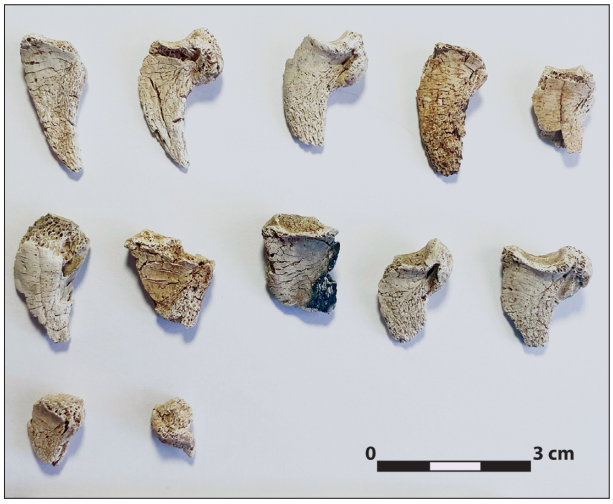

Fig. 2 Bear claws (phalanges) from the inventory of grave №X-22 at the Alejka-7 burial site. – (Photo K. Skvorcov).

An important peculiarity of these finds is that none of them demonstrates traces of processing, while all of them reveal traces of fire.

The remains of wooden box-chambers measuring about 1.0 m × 1.5 m, rare in the local archaeological context and most likely made of planks, were found in all the graves in question. These chambers originally contained the calcified bone fragments of the buried person, which are mostly poorly separated from the remnants of the funeral pyre and only partially washed. As indicated by the composition of the grave inventories, nearly all the burials probably belong to men, with a single currently known exception (Putilovo-2 burial site, grave №787). The quality and value of the grave goods as well as the

5 A traditional importance of the bear in the system of religious and cultic beliefs of the Prussians in the later period up to the Middle Ages is evidenced, for example, by numerous finds of bear claw amulets in burials of the 13th-15th centuries in the territory to the east of Sambia (Valuev et al. 2021)

6 By »burial«, we mean here a human cremation and by »burial complex« a human cremation and an accompanying grave with a horse skeleton (see further details below in text).

7 While no evidence for a local bear population is known in the time period in question for the territory of modern Denmark, southern Sweden and Gotland (Beermann 2016, 53. 73-74), brown bears should have been present on the Sambian Peninsula up to the High Middle Ages, in the Romincka Forest, further to the east of the peninsula - perhaps even up to the end of the 18th century (Tautorat 1983, 23). It thus seems logical to assume that the discussed bear claws originally belonged to animals from a local population. So far, however, we have no reliable scientific proof for this assumption.

construction of the graves allow us to characterise these burial complexes as belonging to people of high social status.

The latter assumption is also supported by the dimensions of the burials, which are two to three times larger than contemporary »ordinary« graves, as well as by the placement of weapons in the burials (**figs 3-4**). In the considered period of time, weapons were only rarely placed in male graves on the Kaliningrad Peninsula. According to the results of the statistical analysis of archaeological excavations that have been conducted in recent years at large flat burial sites, weapons were present in only approximately 10 % of the Dark Age male burials (Skvorcov 2023, 101).

Until recently, the reason for this lack of weapons in the graves (in contrast, Roman Age and Migration period *Aestii* male burials contain numerous weapons) was seen in the assumed general decline of the Sambian-Natangian culture in the 6th century AD (Skvorcov 2010, 190) and in a significant decrease in the living standards of its bearers (and even their subordination to another cultural group of Western Balts; see Skvorcov 2010, 197). However, the discoveries of rich Dark Age *Aestii* burials in the last few years should rather be interpreted as an indication of a so far insufficiently investigated re-organisation of *Aestii* society, which took place in the 6th century AD and is also reflected in the burial rites, i. e. in the composition of grave inventories.

Fig. 3 Grave №258 at the Alejka-7 burial site with a single-edged sword as an element of its inventory. – (Photo K. Skvorcov).

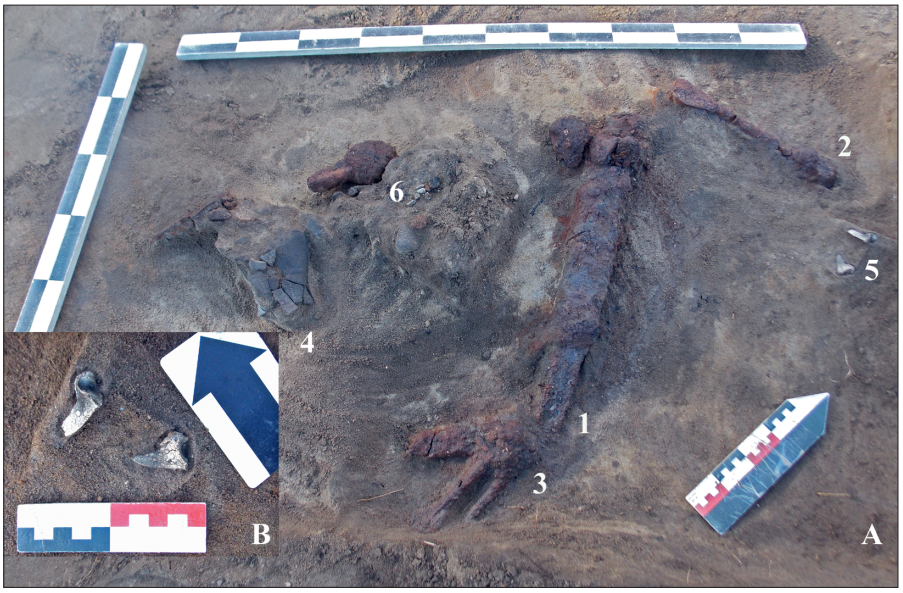

Fig. 4 Grave №726 at the Putilovo-2 burial site. **A 1** single-edged sword. – **2**–**3**. **6** spearheads. – **4** fragmented ceramic vessel. – **5** pair of bear claws. – **B** detail: enlarged picture of bear claws. – (Photos K. Skvorcov).

At the moment, it seems most likely that once the anthropological, i. e. archaeozoological, analysis is applied to calcified bones from further burials with weapons, the number of identified complexes with bear claw finds will increase as well (Kirkinen 2017, 14). It also seems promising to perform a new analysis of the burials with weapons that have already been studied in previous years. Undoubtedly, the fact that almost all of the currently known burials of interest are represented by cremations[8] significantly complicates the analysis of the archaeological and osteological material available to us.

The above-mentioned *Aestii* burials with bear claws comprised the following weapons: single-edged swords (one or, less often, two sword finds in a burial) with a T-shaped cross-section of the blade (often called »scramasaxes« in the publications devoted to local antiquities; e. g. Kazanskij et al. 2017, 31. 34–35; Kazanskij 2020, 142; 2021, 85–86. 92–93. 95) and remnants of wooden and/or leather sheaths decorated with ornamented silver foil, as well as spearheads (one to three finds in a grave). Elements of equestrian equipment such as iron plate spurs were found in a number of the examined burials with bear claws.

The analysis of the funerary inventories allows us to draw a conclusion about their specific unifying elements: much of the jewellery (mostly silver [less often gold] votive bracelets and neck rings; see **fig. 5**) and some of the costume elements (*fibulae*) placed in the burial were often made exclusively for the funerary rite, which is indicated by their physical parameters and the absence of use-wear traces with the simultaneous presence of rough traces of primary jewellery processing. All these features are characteristic for items that were votive elements of the Dark Age grave inventories in Sambia. Among further grave goods, ceramic vessels containing the remains of food and drink should be mentioned; some of this pottery seems to have been made specifically to be placed directly into the grave.

In addition, the burials under consideration often contained drinking horns (obviously derived from aurochs [*Bos primigenius*]), decorated with ornamented pressed silver sheets (for their provenience see Gimbutas 1963, 146; Kazakevičius 1993, 136; Skvorcov 2023, 51. 150) and in some cases provided with decorative silver tips.

The human cremation burials themselves were accompanied, according to the local funerary tradition of that time, by horse inhumation graves, which were placed to the west of, or beneath, the human graves (Kazanskij/Mastykova 2021, 269–270; Skvorcov 2010, 191). While in the 6th to 7th centuries AD horse graves accompanied the cremations of almost all free male members of the *Aestii* society, the number of the sacrificed animals itself could vary and indicate the social status of the buried person (Kazanskij/Mastykova 2021, 275). An ordinary burial complex usually included one horse burial, but in the case of the complexes under consideration the

Fig. 5 Gold votive bracelets and a silver neck ring from graves №258 (**a**) and X-22 (**b**) at the Alejka-7 burial site. – (Photo K. Skvorcov).

8 The rite of cremation was widespread in the territory of the Kaliningrad Peninsula from the 2nd to the 13th century AD (officially, until the forced conversion of the Old Prussians to Christianity and the official ban on non-Christian rites, including funeral rites, in the 13th century AD, but in reality much longer).

high social status of the deceased was emphasised by the presence of two to four (!) sacrificed horses (many of them with saddles) with richly decorated harnesses (**fig. 6**). Elements of these harnesses represent either imports from the settlement area of the Germanic peoples in Europe (from Italy in the south to Scandinavia in the north) or alternatively derivatives of such items made in the Baltic Sea region close to the *Aestii* settlement area (**fig. 7**).

It is indicative that the only one out of the altogether seven burials with bear claws that was not accompanied by a horse burial reveals further unique features (grave №787 at the Putilovo-2 burial site). Judging by the analysis of the grave inventory (which included three chain-linked disc-shaped bronze *fibulae* with silver trimming, a pair of silver bracelets, glass paste beads and a horn comb), it belonged to a woman[9]. The grave also contained two

Fig. 6 Remains of horse burials from funeral complex №685 at the Putilovo-2 burial site. **1–2** skulls of two of the three buried horses. – **3** wooden saddle covered with ornamented silver foil. – (Photo K. Skvorcov).

Fig. 7 Elements of the horse bridle from burial №X-22 at the Alejka-7 burial site. – Silver, gold, bronze, almandine, iron. – (Photos K. Skvorcov).

9 Unlike the strongly expressed »masculine character« of the relevant Roman Age burials, finds of bear skins in the burials are not restricted to male graves in the Migration and Merovingian periods (and well into the Viking Age). In fact, these finds are almost equally distributed between male and female burials (Wamers 2009, 12; Grimm 2013, 291; 2023, 533. 535-536; Lindholm/Ljungkvist 2023, 393).

drinking horns, which were provided with richly decorated fittings of gold and silver foil unique in the local context as well as with horn tips (**fig. 8**). What attracts additional attention is the fact that, contrary to other burial complexes with bear claws, the box-chamber with the grave goods was not found in the northern or central, but in the southern sector of the grave pit.

Fig. 8 Two drinking horns (**1-2**) from grave №787 at the Putilovo-2 burial site. – Silver, gold, bronze. – (Photo K. Skvorcov).

Conclusions

The above-described results of the analysis of the seven funerary complexes in question allow us to identify them as burials of members of an *Aestii* upper class that generally meet the requirements of group 1b of the classification of East Germanic elite burials (see Bierbrauer 1989, 60–61).

Here, however, we will neither go into detail as far as the reconstruction of the structure of *Aestii* society is concerned, nor perform a comparative analysis of the recently revealed burials of the West Balt upper class members with that of the Germanic cultural milieu. Instead, we take a closer look at the bear phalanges and the circumstances of their placement into the burials in question, which are unusual in the local archaeological context.

An important peculiarity of these finds is that none of them demonstrates traces of processing, which makes it less probable that they were used as pendants, amulets or decorative elements[10]. On the other hand, all reveal traces of fire. This observation allows us to assume with great probability that the claws were placed together with the deceased on the funeral pyre and thus exposed to fire[11]. This could have happened in two ways: either the claws were part of a whole bear skin or alternatively only the bear paws were placed on the funeral pyre.

The analysis of Central and Northern European inhumations with bear claws makes it, in certain cases, possible to distinguish between burials that contained complete bear skins and those in which only the bear paws (the number of which could vary as well) were laid in the grave according to the *pars pro toto* rite (Grimm 2023, 32). For the cremations of the Kaliningrad Peninsula, such differentiation is unfortunately, *per definitionem,* not possible. While reconstructing this aspect of the funerary rite, the following considerations should be taken into consideration: in case of bear paws, further paw bones should have survived the high temperatures of the pyre. However, there are currently no indications

10 This observation corresponds with the results of the archaeological analysis of contemporary Scandinavian graves with bear claw finds, which are interpreted as evidence of bear skins in the burials (Lindholm/Ljungkvist 2016, 8).

11 E. Wamers (2009, 8) comes to similar conclusions when discussing bear claw finds in Germanic cremation graves of the pre-Roman as well as the Roman Age.

of their presence in the burials (admittedly, some of the bone material from the cremations has so far not been identified). Additionally, it cannot be excluded that some of the bones were either completely consumed on the pyre or were not transferred to the grave. Whatever the case may be, in the face of the objective lack of further bear paw bones in a burial, the hypothesis of bear skin placement currently seems to be the most probable. Also, the number of the claw finds can serve as an additional indication: in general, the higher the number of claw finds in the burial, the higher the probability that a complete bear skin was placed with the dead on the funeral pyre. Unfortunately, and contrary to the observations on inhumations in Scandinavia (Petré 1980, 6–8; Grimm 2013, 279. 281. 283–284; 2023, 33–34), the local cremation rite does not allow to judge how exactly the bear skin was used in the burial, i. e. whether the deceased was placed on it or was instead covered by it during the cremation (for similar observations on the Roman Age cremations in the Elbe Germanic area see Wamers 2009, 8. 12–13). Nor can the possibility that the bear skin had already been used as (ritual?) clothing during the life of the dead person be excluded. At the same time, the traces of fire on the bear phalanges exclude the possibility, demonstrated in the case of comparable cremations in Northern Europe, that an unburned bear skin was used to wrap a container (organic box, ceramic vessel, etc.) that held cremated human bones before the latter was placed in the grave (Grimm 2013, 283–285; 2023, 538 tab. 1).

The identification of the deceased in the grave №787 at the Putilovo-2 burial site as a woman, according to the grave inventory with jewellery but without weapons, allows us to interpret the placement of a bear skin in the grave more broadly than in the cases of other burials under consideration here – and not as a reflection of warrior cult rituals, which probably originated in the Germanic cultural milieu. Instead, the bear skin should be seen rather as a symbol of high social status that is clearly not necessarily related to the membership in any warrior society[12]. Similar conclusions were drawn on the basis of comparable material from Germanic burials dated to the first centuries AD (Petré 1980, 9; Wamers 2009, 10; Grimm 2013, 292; Oehrl 2013, 312–313; Lindholm/Ljungkvist 2023, 393), although bear claw finds appear there in both elite and non-elite contexts, particularly during the Migration Period (Lindholm/Ljungkvist 2016, 8. 10. 12).

The peculiarities of the phenomenon of bear skin placement in the graves in the local ethno-cultural context are a subject of future research. However, it is already obvious that the deceased in the burials with bear claw finds belonged to the high strata of Dark Age *Aestii* society. The burials in question, along with similar funerary complexes discovered in the last years (Skvorcov 2023), make it possible to conclude that, contrary to views on this topic which were widespread until recently, the local *Aestii* society, similar to contemporary Germanic peoples, had a hierarchical and not an egalitarian structure. It thus remains possible (and, from the point of view of the authors, very probable) that further field investigations will lead to the discovery of contemporary burials of an even higher social level (comparable to that of group 1a of the above-mentioned classification of V. Bierbrauer [1989, 55–60]) than the burials with bear claws that are discussed here.

12 Depending on the various characteristics of the funerary complexes as well as their historical and cultural, i. e. geographical, context, bear claw (skin) finds in the burials can be interpreted in different ways, which has been the subject of scientific discussions (see Petré 1980, 10. 12-13; Grimm 2013, 278; Oehrl 2013, 297, with references; Lindholm/Ljungkvist 2016, 10).

Bibliography

Beermann 2016: S. Beermann, Bärenkrallen und Bärenfelle in Brand- und Körpergräbern der vorrömischen Eisenzeit bis Völkerwanderungszeit in Mittel- und Nordeuropa. Univforsch. Prähist. Arch. 279 (Bonn 2016).

Bierbrauer 1989: V. Bierbrauer, Ostgermanische Oberschichtsgräber der römischen Kaiserzeit und des frühen Mittelalters. Arch. Baltica 8 = Peregrinatio Gothica, 1989, 39–106.

Engel 1931: C. Engel, Beiträge zur Gliederung des jüngsten Zeitalters in Ostpreussen. In: Congressus Secundus Archeologorum Balticorum Rigae, 19.–23.VIII.1930. Acta Universitatis Latviensis Philologorum et Philosophorum Ordinis Series, T. I, Suppl. I (Riga 1931) 313–336.

Gimbutas 1963: M. Gimbutas, The Balts (London 1963).

Grimm 2013: O. Grimm, Bear-skins in northern European burials and some remarks on other bear-related furnishings in the north and middle of Europe in the first millennium AD. In: O. Grimm O. / U. Schmölcke (eds), Hunting in Northern Europe until 1500 AD – Old Traditions and Regional Developments, Continental Sources and Continental Influences. Schr. Arch. Landesmus. Schloss Gottorf, Ergr. 7 (Neumünster 2013) 277–296.

2023: O. Grimm, Bear skin burials revisited: Norway and Sweden, mainly Migration Period. In: O. Grimm (ed., in co-operation with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 533–546.

Grunau 1876: S. Grunau, Preussische Chronik I, T. II (Leipzig 1876).

Kazakevičius 1993: V. Kazakevičius, Plinkagailio Kapinynas 10 (Vilnius 1993).

Kazanskij 2020: M. M. Kazanskij, Эстии и Аттила: о контактах населения самбийско-натангийской культуры со Средним Дунаем в гуннское и постгуннское время. Арх. Вести 27, 2020, 131–152.

2021: M. M. Kazanskij, Стратификация погребений с оружием и всадническим снаряжением в могильниках самбийско-натангийской культуры эпохи Великого переселения народов и раннемеровингского времени. Арх. Вести 33, 2021, 86–106.

Kazanskij/Mastykova 2021: M. M. Kazanskij /A. V. Mastykova, Захоронения с конями на могильниках самбийско-натангийской культуры раннего средневековья и антропологические данные. Stratum 5, 2021, 267–279.

Kazanskij et al. 2017: M. M. Kazanskij / A. V. Mastykova / K. N. Skvorcov, Признаки социальной стратификации у населения самбийско-натангийской культуры в начале средневековья [середина V–VII в.]. PA 3, 2017, 28–45.

Kirkinen 2017: T. Kirkinen, »Burning pelts« – brown bear skins in the Iron Age and Early Medieval (1–1300 AD) burials in south-eastern Fennoscandia. Estonian Journal Arch. 21, 2017, 3–29.

Lindholm/Ljungkvist 2016: K.-J. Lindholm / J. Ljungkvist, The Bear in the Grave: Exploitation of Top Predator and Herbivore Resources in First Millennium Sweden – First Trends from a Long-term Research Project. European Journal Arch. 19, 2016, 3–27.

2023: K.-J. Lindholm / J. Ljungkvist, Bears and the Viking Age transition in Sweden. In: O. Grimm (ed., in co-operation with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 387–404.

Oehrl 2013: S. Oehrl, Bear hunting and its ideological context (as a background for the interpretation of bear claws and other remains of bears in Germanic graves of the 1st millennium AD). In: O. Grimm / U. Schmölcke (eds), Hunting in Northern Europe until 1500 AD – Old Traditions and Regional Developments, Continental Sources and Continental Influences. Schr. Arch. Landesmus. Schloss Gottorf, Ergr. 7 (Neumünster 2013) 297–332.

Petré 1980: B. Petré, Björnfällen i begravningsritualen – statusobjekt speglande regional skinnhandel? Fornvännen 75, 1980, 5–14.

Prasolov 2013: J. V. Prasolov, К вопросу об использовании перевязей типа *balteus Vidgiriai* на территории самбийско-натангийской культуры в IV–V вв. н.э. In: N. A. Makarov / A. V. Mastykova / A. N. Hohlov (eds), Археология Балтийского региона (Moskva, Sankt-Peterburg 2013) 80–96.

Prassolow 2013: J. A. Prassolow, Schulterriemen vom Typ *balteus Vidgiriai* im Verbreitungsgebiet der samländisch-natangischen Kultur. Acta Praehist. Arch. 45, 2013, 87–107.

2018: J. A. Prassolow, Die völkerwanderungszeitlichen Dolchmesser der samländisch-natangischen Kultur auf dem Gebiet des ehemaligen Ostpreußens. Stud. Siedlungsgesch. Arch. Ostseegebiete 15 (Neumünster 2018).

Prassolow/Skvorzov 2016: J. A. Prassolow / K. N. Skvorzov, On the significance and research potential of the Grebieten burial ground: a reconstruction of the prewar state of knowledge and the prospects for modern research. Arch. Baltica 23, 2016, 81–95.

Von See 1961: K. von See, Berserker. Zeitschr. dt. Wortforsch. 17, 1961, 129–135.

Skvorcov 2010: K. N. Skvorcov, Могильник Митино V–XIV вв. (Калининградская область). По результатам исследований 2008 г. Материалы охранных археологических исследований. Т. 15, ч. 1 (Moskva 2010).

2016: K. N. Skvorcov, Отчёт об охранных археологических раскопках на грунтовом могильнике Митино-1 в Гурьевском городском округе Калининградской области в 2015 году. Т. 1–2 (Moskva 2016).

2023: K. N. Skvorcov, Элитные погребения эстиев в эпоху Великого переселения народов. Материалы спасательных археологических работ 29 (Moskva 2023).

Sturluson 2011: S. Sturluson, Heimskringla V.1. The beginnings to Óláfr Tryggvason (London 2011).

Sundqvist 2023: O. Sundqvist, Bears in Old Norse religion with specific references to the berserker. In: O. Grimm (ed., in co-operation with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023) 655–676.

Tautorat 1983: H. G. Tautorat, Rominten. Hrsg. Landesmannschaft Ostpreußen, Abteilung Kultur, geänd. Nachdr. (Leer 1983).

Tischler/Kemke 1902: O. Tischler / H. Kemke, Ostpreußische Altertümer aus der Zeit der großen Gräberfelder nach Christi Geburt (Königsberg 1902).

Valuev et al. 2021: A. A. Valuev / S. A. Denisov / K. N. Skvortsov, Амулеты-подвески «медвежий коготь» из погребений XIII–XV вв. некрополя Альт-Велау. КСИА 264, 2021, 290–306.

Wamers 2009: E. Wamers, Von Bären und Männern. Berserker, Bärenkämpfer und Bärenführer im frühen Mittelalter. Zeitschr. Arch. Mittelalter 37, 2009, 1–46.

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Animal Symbolism: From Snake and Duck to Dragon and Hare

Maksim Čarnâūski

The Snake and the Duck of the Belarusian Lakeland

ABSTRACT

From the 5th to the middle of the 2nd millennium BC, interconnected archaeological cultures existed in the territory of northern Belarus. In the mid-4th millennium BC, ideas related to the image of the duck (waterfowl) and the (grass) snake arrived in the region. They are represented first by motifs on ceramics (late 4th to first half of 3rd millennium BC), and later by small sculptures/figurines of bone and clay (second half of the 3rd to first half of the 2nd millennium BC). The duck and snake motifs next appear in the 5th–11th centuries AD, associated with artefacts of the late Baltic population and the Smaliensk-Polack long mound culture. With the spread of Christianity, these motifs passed into oral tradition and can be traced through regional folklore. One of the most plausible explanations for the origin of duck depictions is a myth about the creation of the world. The snake represents certain chthonic forces and might have been a reference to regional totemic beliefs.

KEYWORDS

Northern Belarus / Neolithic / Bronze Age / Middle Ages / ornithomorphic and zoomorphic images / duck / snake

Description and Discussion of Finds

The terms »Belarusian Lakeland« and »northern Belarus« are more or less synonymous. The area (**fig. 1**) is situated mainly in the Dzvina river basin (Daugava/western Dvina), and it includes small parts of the Dniapro river basins (Dnipro, Dnieper; the upper reaches of the Biarezina) and the Nioman river (Nemunas, Nemen; the upper reaches of the Vilija river (Neris). This terrain was mostly formed during the last Ice Age, specifically at the beginning of the retreat of the ice, when the modern outlines of rivers emerged and the eponymous system of lakes was shaped.

The Neolithic to the Early Bronze Age in the East European Plain Forest Zone (Second Half of the 6th to First Half of the 2nd Millennium BC)

During the period from the second half of the 6th to the middle of the 4th millennium BC, the territory of the Belarusian Lakeland formed the southern periphery of the Narva culture. Its lithic, bone and antler industries continued Mesolithic traditions here, and local northern-Belarusian ceramic finds are mostly characterised by half egg-shaped and large,

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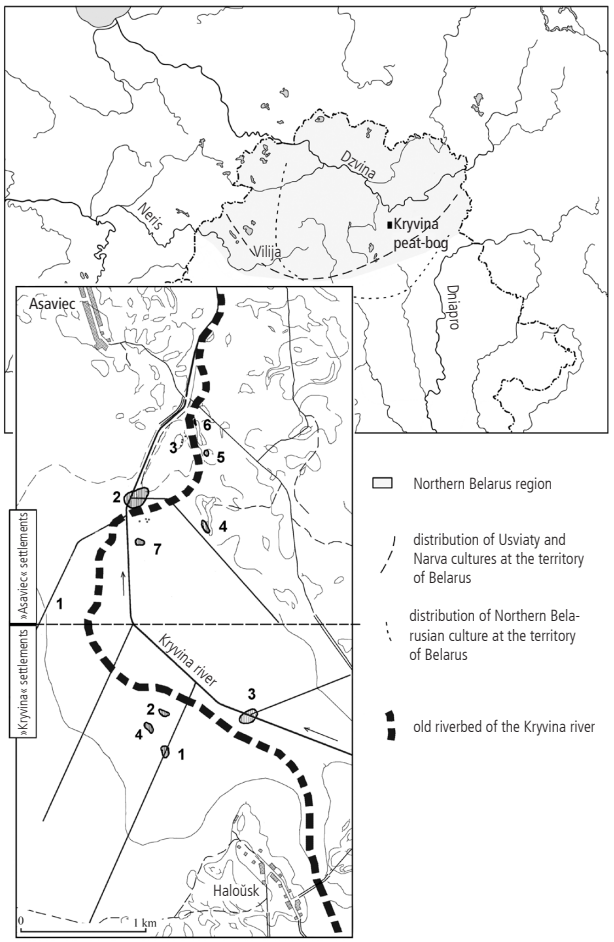

Fig. 1 Location of the Kryvina micro-region in Belarus and its settlements. – (Graphics M. Čarnâŭski).

wide, open, pointed-based pots (Čarnâŭski 1996, 134–135. 140; 1997a, 191–200; Černâwskij 2014, 31–33). The coils were joined in a diagonal (N-type) and concave-convex fashion (U-type), and the temper used for the clay paste was made up predominantly of organic matter and crushed shells. The surface of the vessels was covered by comb impressions made by a toothed spatula, resulting in a »scratched«, striated surface. Major ornamental elements were impressions made by a fine-toothed stamp, notches, pits, punctures, and incised lines. Rows of oblique impressions, horizontal fishbone patterns, and obliquely falling rows are the most common motifs. The decoration was placed in spaced-out horizontal rows, predominantly on the upper part of the vessels. The rims were rarely decorated (Černâwskij 2014, 31–32).

Around the mid-4th millennium BC, the region was »infiltrated« from the north by a small but active population of the Comb-Pit Ware culture. They used rather uniform ceramics: big, egg-shaped wares with a rounded, less frequently conical base, with a diameter at the rim of c. 30 cm. Grus and coarse sand were added to the clay paste as a temper. The surface of the pots was smoothed out, with visible bulges of mineral admixtures on it. The rims were thickened and obliquely cut inwards. The most common decorative elements were predominantly rounded pits, imprints of a wide-toothed comb, caterpillar-like imprints, and pricks. The vessels were mostly decorated over the whole surface with alternating belts of pit and comb elements. Scrapers on flakes, blades, rhomboid and leaf-shaped arrowheads are quite common flint artefacts (Čarnâŭski 1997a, 206–208; Černâwskij 2012a, 92–94).

Under the influence of the incoming Comb-Pit Ware culture, the Narva culture transformed into the Usviaty culture in the research area (Černâwskij 2012a, 94), a process that had finished by the end of the 4th millennium BC. The biggest changes are evident in the pottery: while maintaining the Narva composition of the clay paste (with organic matter and crushed shells), the outer and inner surfaces of the wares became smooth – a result of the »paddle and anvil« method. The rims of the vessels became slanted inwards, and often broader; the bottoms became more rounded. The coil joints became exclusively U-shaped. Sometimes, there are signs of an additional working of the surface with bone or ceramic burnishers. The dominant decorative elements are various notches, pricks, small shallow pits, caterpillar imprints and, less frequently, incised lines and comb impressions. Decorative motifs, such as horizontal rows of oblique impressions of stamps and notches, mostly continue to follow and develop the traditions of the Narva culture. Occasionally, they form horizontal fishbone patterns, diamonds, and diagonal and vertical lines. Incised lines are sometimes organised into an oblique net pattern. For the Usviaty culture, frequent ornamentation of the bevels and inner surface of the rims is characteristic. The ornamentation is somewhat spaced out, dominated by a horizontal orientation of bands (Charniauski 2016, 91).

The most distinctive feature of the Usviaty ceramics is the presence of different geometric designs formed of lines of different stamp prints, as well as stylised images of waterfowl, snakes and men. Some geometric designs, such as rhombic patterns or short zigzags, are interpreted by a number of researchers as the images of eggs and waves. Other designs are explained as images of water chestnut leaves (*Trapa natans* L.; Čarnâŭski 2013).

Bird images on northern-Belarusian vessels are mostly known from the settlements of Asaviec 2 (Biešankovičy district, Viciebsk region) and Kryvina 1 (Sianno district, Viciebsk region), which are situated in the archaeological micro-region of the Kryvina peatbog.

A pottery fragment from the Asaviec 2 settlement comes from a large vessel that was uncovered in the north-eastern part of the settlement, at the base of the site's cultural layer (at a depth of 1 m below ground surface). The surface of the fragment is smooth, worked with the »paddle and anvil« method; the clay paste is characterised by the inclusion of crushed freshwater mussel shells. The fragmentary images of two waterfowl (probably ducks) are visible on the sherd (**fig. 2, 1**). On the top left part, the lower half of a bird is visible, specifically its feet, belly, and the lower part of its breast. The lower part of the fragment depicts the upper part of a bird with specifically the head, back, tail and breast merging into the belly. To the right of each of the birds, and in the lower image to the left as well, there are short stretches of a one and a half horizontal fishbone pattern, possibly representing waves. Perhaps the whole pot was covered in such motifs – depicting ducks among the waves. All the elements were incised with a wide-toothed stamp. The body of each of the birds is created using three rows of oblique impressions inclined to the right; in the case of the lower bird, between the first and the second row, an additional row of impressions inclined to the left was added, forming a one and a half horizontal fishbone pattern. The feet and the tail are executed using the same slanted impressions, tilted to the left. The base of the neck and part of the head are formed by double parallel impressions which, on the dorsal side of the neck and the top part of the head, are surrounded by the superimposed left-tilted impressions of a wide-toothed stamp. Breast and belly are underlined with the same row of such impressions. Judging by the visual similarity, ornithologists classify the images as either mallard (*Anas platyrhynchos*) or goose (*Anser*).

The crust from the inner surface of this sherd was dated to 4370 ± 50 BP (Ua-34618), which corresponds to a calendar date of 3030–2910 cal BC (68 % probability) or 3110–2880 cal BC (95 % probability; Zajceva et al. 2008, 79).

Mihal M. Čarnâûski, the main researcher of the Usviaty culture in Belarus, noted that the »classic« images of ducks on the ceramics in the forest zone of eastern Europe were created predominantly using wide-toothed combs or in form of rounded pits. Such comb impressions are, however, absent among the wares of the Kryvina peatbog Usviaty culture. Even fine-toothed comb impressions, characteristic for earlier and later periods, and for the Neolithic ceramics from the territories neighbouring Belarus, are absent here. However, the ware with the ducks from Asaviec 2 was decorated specifically using the impressions of a wide-toothed tool that was »foreign« to the local population. This emphasised the canonical nature of the visualization of a mythological image and is a practice that was possibly borrowed from the traditions of the Comb-Pit Ware culture (Čarnâûski 2008, 67–68).

Another pottery fragment, a small sherd of Usviaty ware, comes from the Kryvina 1 settlement. The silhouette of a bird depicted on it is much more simple and laconic, and it is formed by a rounded double line of small pits, 18 in each row (**fig. 2, 2**).

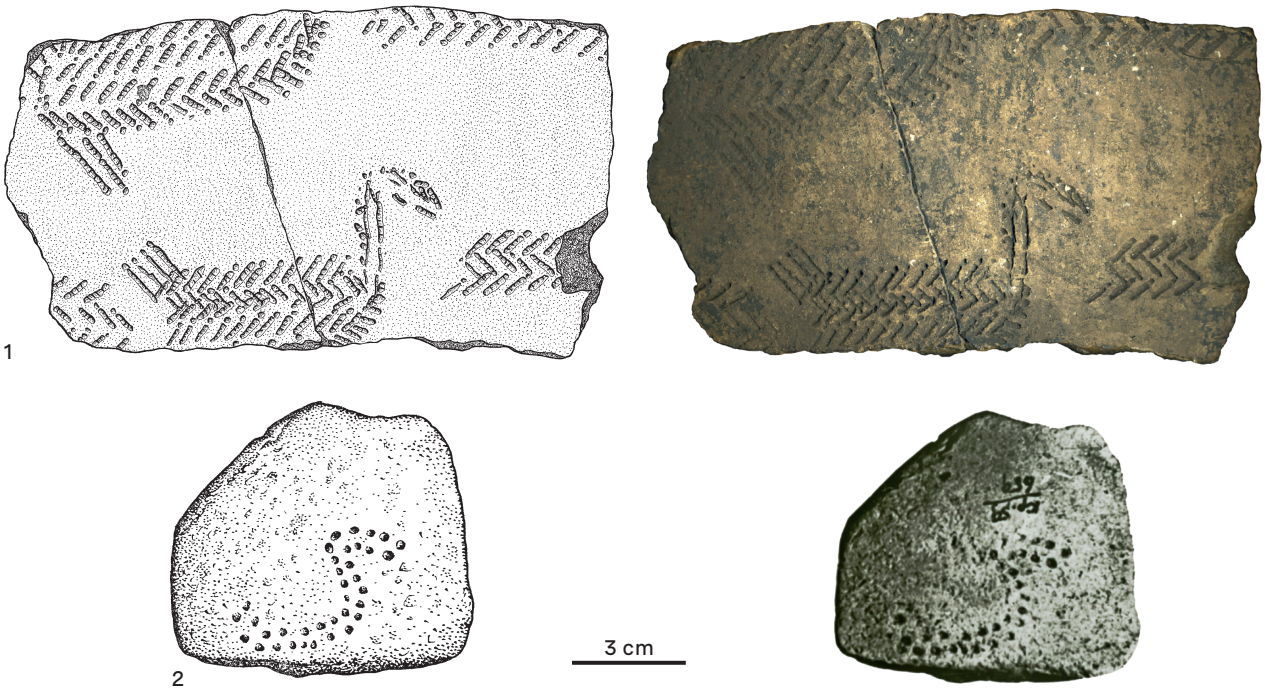

Fig. 2 Images of birds on Usviaty culture ceramic vessel remains. Late 4th to first half of 3rd millennium BC. **1** Asaviec 2. – **2** Kryvina 1. – (1 drawing A. Tkachou, photo Mihal Čarnâûski; 2 drawing after Čarnâûski 2008, fig. 3, 2, photo Mihal Čarnâûski).

There is another group of Usviaty ware fragments from Asaviec 2, the decorative motifs of which can with a certain degree of probability be interpreted as bird imagery (**fig. 3**). It consists of two fragments of small bowls and one fragment of a large pot. On both bowl fragments, schematic images of possible heads of waterfowl with long necks are evident, which are in turn incorporated into a composition of oblique elements. On the pot fragment (**fig. 3, 3**), we can see probably the same image – a schematically portrayed head on a long neck. It is important to note that on one of the bowls, and also on the pot, the possible bird images are represented by two rows of impressions, just like those on the fragment from Kryvina 1 described above (**fig. 2, 2**). The style of representation of neck and head here is analogous.

Complex geometric compositions are also characteristic for the Usviaty culture ceramics. Amongst these there are double vertical zigzags which, according to some scholars, represent images of snakes (**fig. 4**; see Černâwskij 2012a, 95).

From the beginning of the 3rd millennium BC, bearers of new traditions began to gradually penetrate the region dominated by the Usviaty population. The first were representatives of the Globular Amphora culture, who most probably arrived from the Nioman region, travelling via the rivers through Wilija and Dzisna (Čarnâūski/Vajtovič 2019). Shortly after that, members of the Corded Ware culture entered the region via the Wilija from the west, Dzvina from the north, and lastly and chronologically later, via the Biarezina and other small right-bank tributaries of the Dniapro river from the south. The last process was very prolonged, possibly happening in several waves, with long periods of coexistence with the larger local Usviaty population. After all, as a result of their symbiosis, at the end of the second quarter of the 3rd millennium BC, the northern-Belarusian archaeological culture spread in the region. Just as in the previous instances, the basis of this culture was formed by the local population which, however, accepted the outer characteristics of the incomers.

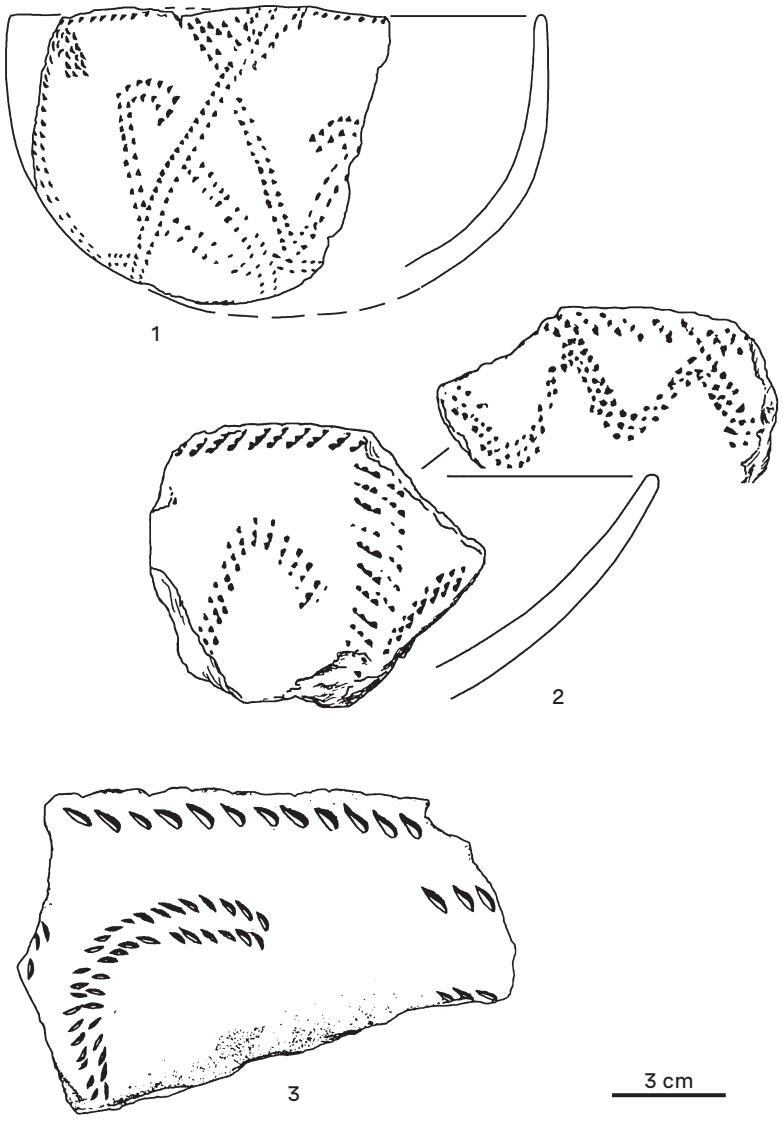

Fig. 3 Asaviec 2. Possible images of birds on Usviaty culture ceramic vessels. Late 4th to first half of 3rd millennium BC. – (Drawings M. Čarnâūski).

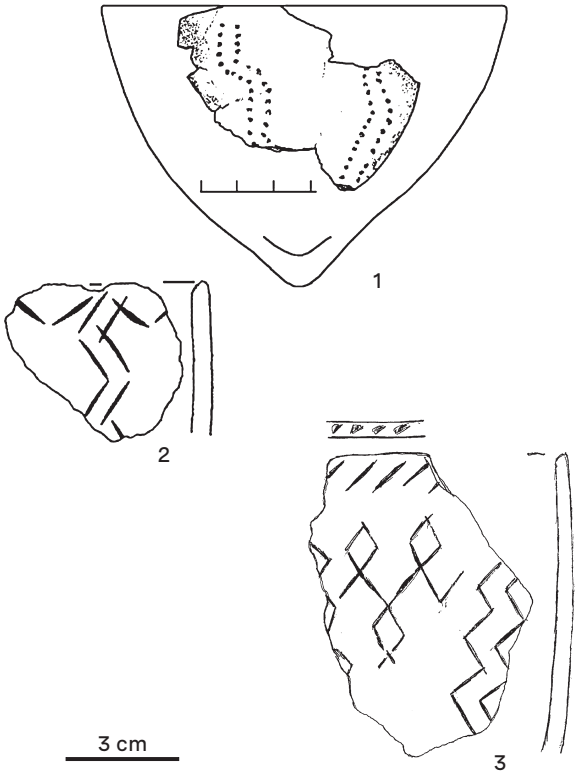

Fig. 4 Asaviec 2. Possible images of snakes on Usviaty culture ceramic vessels. Late 4th to first half of 3rd millennium BC. – (Drawings M. Čarnâūski).

As a result, the material culture adopted new types of amber and bone jewellery, which might have been connected with sun and fire cults and cannot be discussed here any further (Čarnâūski 2015, 249), and new types of weapons, hunting tools, work and household tools made of flint, stone, bone and antler (Čarnâūski 2007, 75).

The outward appearance of the ceramics also changed. Firstly, we see an increasing diversity in the forms of northern-Belarusian wares. There is evidence for the use of pots of various sizes, from large sack-shaped ones to miniature ones, bowls, and cups. Quite quickly, the rounded-tapered bases became flat. The profiles of vessels became more varied, figured, and often S-shaped; the design of the rims was now also characterised by diversity – outwardly bent, straight, inwardly bent, rounded, flat, or oblique. The joints, which during the time of the Usviaty culture had become U-shaped, once again became N-shaped. The surface of the wares was brushed with a bunch of grass. However, the recipe of the vessels' clay paste at first remained the same; it was still tempered with shell and organic material (chopped grass), with an insignificant amount of grog. Shortly after, the organic component increases, possibly due to the addition of bird droppings (the fabric shows inclusions of small feathers and down). It is only when we get closer to the turn of the 3rd millennium BC that sand began to be used as temper in addition to the materials mentioned above. During the first half of the 2nd millennium BC, the organic components gradually began to disappear, leaving only sand and grog; gradually, grus began to be used, too (Čarnâūski 1997b, 321–322; Černâwskij 2012b, 161–162; Charniauski 2016, 91).

The ornamentation of the northern-Belarusian culture pottery differs from that of the preceding Usviaty culture in its increased saturation, often with the same individual décor elements but of a smaller size. Usually, the decoration covers the whole vessel's surface, including the base, the top, and often the inner part of the rim. The main decorative elements are various impressions of smooth and comb stamps, pit impressions, and notches. »Caterpillar« impressions are very seldom. The use of cord and incisions is rare. Ornamental compositions are oriented mostly horizontally. Rows of stamp impressions tilted to the right or left, herringbone patterns and zigzags made by the same stamps, and zones of pit impressions made up of four to five rows are the most characteristic decorative elements on the northern-Belarusian culture ceramics. Less frequently, one encounters more complex elements, such as a »tree«, arcs made by cord impressions, and a parquet pattern. Figurative motifs are unknown, with the exception of a single fragment from the Asaviec 2 settlement that depicts a man (Čarnâūski 1997b, 322–323; Charniauski 2016, 91).

However, the images of ducks and snakes are represented in this archaeological culture, too, only here as small figurines made of bone and clay. Two three-dimensional sculptural duck (waterfowl) heads carved out of bone have been excavated so far at Asaviec 2. One of the heads, which was broken off from the rest of the figurine at the neck, is particularly realistic and expertly made. It has an accurately depicted beak, nares and eyes (**fig. 5, 1**). The fragment, which has a total length of 68 mm, was discovered in the lower section of the layer dominated by northern-Belarusian culture material (between 60–80 cm beneath the present-day surface). The second example, also with a broken neck, is represented by a similar fragment. The head is more schematic, without distinctly marked eyes (on one side there is an indistinct mark where the eye would be) or a defined beak (**fig. 5, 2**). Under the neck of the bird, a ledge of uncertain purpose was cut. The fragment was discovered in the upper half of a layer dominated by northern-Belarusian culture materials (20–40 cm beneath the present-day surface).

Possible depictions of birds can also be observed in the range of pendants made from split boar tusks,

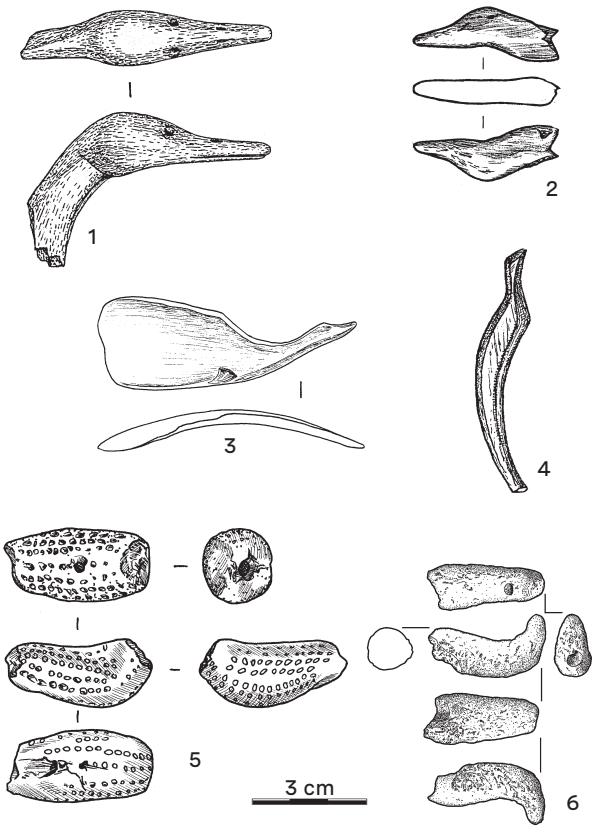

Fig. 5 Figurines of birds made of bone (**1-4**) and clay (**5-6**). Northern-Belarusian culture, second half of 3rd to first half of 2nd millennium BC. **1-4** Asaviec 2. – **5** Kryvina 3. – **6** Biarešča 1. – (1–2. 4 after Čarnâŭski 2015, fig. 7, 3–4; 11, 1; 3. 5 drawings T. Zinchanka; 6 drawing M. Čarnâŭski).

discovered in the northern-Belarusian culture layers of the settlements Asaviec 2 and Asaviec 7 in the Kryvina peatbog (**fig. 5, 3-4**; Malyutina/Charniauski 2021, 34–39 fig. 4).

Ornithomorphic images from that period are also known among the clay artefacts: A damaged clay »duck« statuette was discovered at the bottom of the modern (artificially changed) bed of the Kryvina river, which was dug through the Kryvina 3 settlement (the site contains almost exclusively northern-Belarusian culture materials). This artefact is a fairly realistic figurine which, however, had its head and the tip of its tail broken off in antiquity. The preserved fragment, which measures 37.5 mm × 15 mm × 19 mm, consists of the body of the bird with a distinct breast, neck, and tail (**fig. 5, 5**). Its entire surface is decorated by long rows of small pit impressions. On the back and on the belly, four such rows cross the figurine from one end to the other. On the sides, the rows (three on one side and four on the other) begin at the tail and reach the breast, where they terminate at the same level. As a result, this creates the impression of folded bird's wings. The statuette has an oblique hole through it, which goes from the belly to the back. Another possible clay artefact, of a more simple design, originates from the Biarešča 1 settlement in the Liepiel district, Viciebsk region (**fig. 5, 6**). This can be broadly dated from the beginning of the 3rd to the mid-2nd millennium BC (Usviaty and northern-Belarusian cultures).

The images of snakes in the northern-Belarusian culture material record are represented by small bone figurines (realistic or schematic). All of them were found at the Asaviec 2 settlement. The first, with a length of 142 mm and made out of antler, has been preserved almost in its entirety (**fig. 6, 2**). The figurine has a spindle-shaped body; just the very tip of the tail was broken off. The sub-rhombic head is defined by light and smooth thinning and is lifted slightly above the body. The mouth is well-defined (by drilling), as are the eyes. The whole surface of the artefact, from the back and sides to the belly, is covered by long rows of slanted notches; on the back and the sides each successive row is oriented in the opposing direction, thus creating a fishbone pattern, which is a classic element of northern-Belarusian culture ceramic decoration. On the upper half of the figurine, on the belly side, there is a ledge with a hole for fastening. According to the morphology of the head, it can be inferred that the figurine represents a grass snake (*Natrix natrix*).

The second snake figurine was excavated in two fragments a small distance apart. It was manufactured from the wall of a tubular bone, and it is 147 mm long. It is an elongated spindle-shaped object, with the most significant enlargement in the middle of the artefact and at its head (**fig. 6, 3**). The width and height at its head are 9.5 mm × 9 mm, whereas at the widest portion of the body it measures 10.5 mm × 9.5 mm. The figurine is slightly curved in profile, with the lowest point in the middle of the artefact, and the head and tail raised relatively to it by 15 mm. The shape of the head is anatomically correct, elongated-pointed-rounded, with the mouth marked by incisions. The eyes are marked by two small, rounded pits. At the transition from the head to the body, in the lower part, towards the belly, a mounting hole was made using bilateral drilling. The transverse fracture of the artefact into two parts runs through this hole. On the fragment with the head, on the small undamaged section on the left, a semi-circular transverse notching begins, the remains of which are also evident along the entirety of the damaged fragment. On the other half, on the belly side next to the break, at the lowest point, one can see two overlapping, semi-circular notched patterns, one of which is at an angle towards the direction of the fracture. The notched patterns were created on each half separately for the repair after the artefact had been broken. Starting from the right eye, and

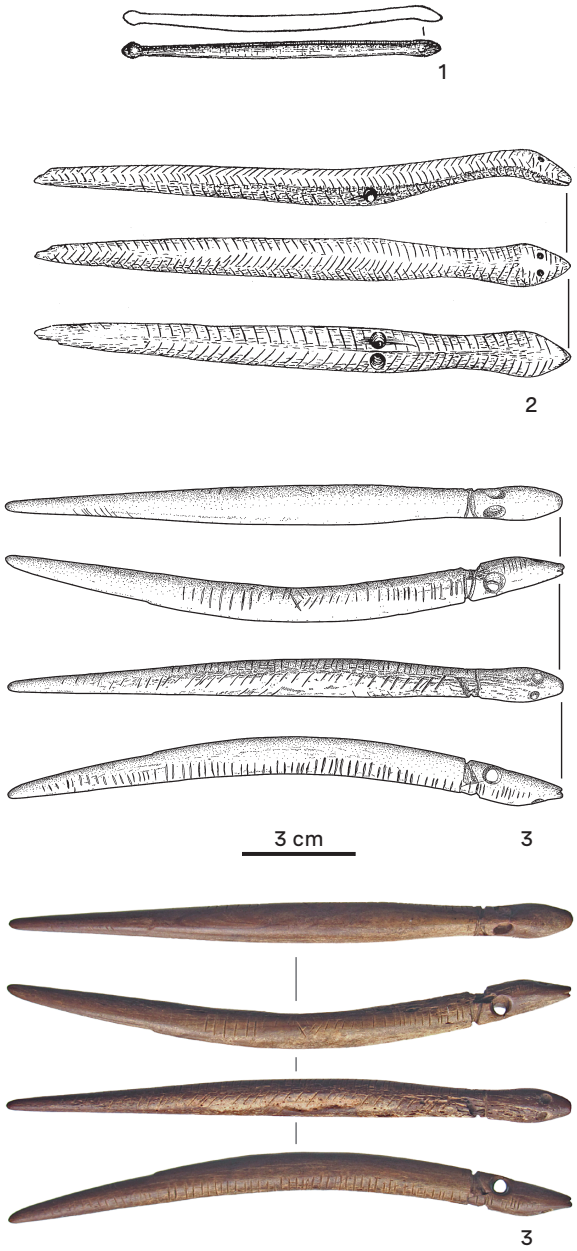

Fig. 6 Asaviec 2. Figurines of snakes made of bone. Northern-Belarusian culture, late 4th to first half of 3rd millennium BC. – (1–2 after Čarnâûski 2015, figs 5–6; 3 drawing and photo M. Čarnâûski).

slightly stepped back from the left eye, there are two rows of ornamentation on both sides. The right one does not reach the tip of the object by about 1/3 of the length, the left one reaches almost the very tip of the tail. The right band of ornamentation is at first (near the head) represented only by a row of vertical, slightly right-tilting notches, after which a row of left-tilted notches has been added, creating a classic horizontal fishbone pattern. On the left side of the figurine, the ornamentation also begins at the head as a single row of vertical, slightly left-tilted notches, after fourteen of which a row of right-tilted notches begins above it, once again creating a horizontal fishbone pattern. The ornamentation from the left and right sides for the most part practically joins on the back. The pendant was discovered in two pieces at the top of the layer, 80–90 cm below the present-day surface of the settlement, close to the »Usviaty–northern Belarusian culture transition horizon«.

The third artefact is a relatively schematic depiction of a snake made from a small bone (**fig. 6, 1**). The elegant, diamond-shaped head is also slightly raised, but the mounting in this case was designed not as a hole but rather as a spherical ending on the tail, which would have allowed the artefact to be hung with its head facing downwards. Discovered at the top of the cultural layer (up to 20 cm beneath the present-day surface), which was dominated by remains from the northern-Belarusian culture, its dimensions are 84 mm × 5 mm × 4.5 mm.

The mid-2nd millennium BC marks the end of the northern-Belarusian culture's presence in the Belarusian Lakeland, which was most likely caused by dramatic changes in the climate that resulted in an average rise in the water level of 2 m across all the lakes in northern Belarus, bringing it up to modern water levels. This would have had a tremendous impact on the lifestyle of the inhabitants, who depended strongly on the local environment. They might have fallen increasingly under the influence of southern populations, whose economy would have been oriented more towards production activities.

The Middle/Late Bronze Age (Middle and Second Half of the 2nd Millennium BC) and the Iron Age (7th Century BC to 4th Century AD)

Knowledge about the Belarusian Lakeland in the middle and latter half of the 2nd millennium BC is very poor. There is only a limited number of known settlements with rather few artefacts from that time, and artefacts made of organic materials are unknown. There is much more research concerning the Iron Age of this region (7th century BC to 5th century AD), mostly in relation to hillfort excavations. But for the Middle and Late Bronze Age and the Iron Age in general we do not have any artefacts with duck (waterfowl) or snake depictions from the territory of northern Belarus.

The Middle Ages (5th–11th Centuries AD)

In materials from the third quarter of the 1st millennium AD, at the Prudniki settlement in the Miory district of the Viciebsk region, a duck figurine made of bone was found. Its head is missing the front part

with the beak; the tail is prolonged. The figurine is decorated with chaotic dot ornamentation on both sides of the breast and neck. The tail is incised with complex patterns, among which there are diamonds, horizontal zigzags, an image in the form of the letter »M«, broken lines and crosses. Several dots can be traced on the bottom of the tail as well. On the upper plane of the tail part, in addition to carved lines, a row of dots has been applied (**fig. 7, 1**), and there is a hole in the back. One bone hairpin has also been found at the site, with a head that can be interpreted as a stylised depiction of a snake (**fig. 7, 2**; Šadyra 2006). At that time, the Prudniki settlement was inhabited by a population of Balts who used a coarse pottery (Šadyra 2006, 47. 64. 72).

In the period from the 8th to the 11th centuries AD, the territory of northern Belarus, except for its extreme western part, was dominated by the Smaliensk-Polack long mound culture. The people of this culture are known from early chronicles as the Kryvichy tribe. In the early stages of their existence, according to some scholars, they were representatives of the Baltic world. Shortly after, during the time of the active penetration of the Slavs into the region and the beginning of the processes of state formation, there was a period of rapid Slavisation of the population. At the same time, the Baltic cultural component continued to play an important role and remained visible in their material culture (Šadyra 2006, 114. 133; Šmidt 2012, 117–118).

Bone duck pendants are found in the assemblages of female burials, where they appear as one of the cultural markers of the Kryvichy. In the Belarusian Dzvina region, they have been found in two cemeteries: Biaskatava in the Haradok district of the Viciebsk region (two examples), and Barki in the Polack district of the Viciebsk region (11 examples; see Štyhaŭ 1992, 115. 118). These pendants have a similar morphology and some of them are decorated (**fig. 7, 4-8**). They could have been used as elements of necklaces or belt sets.

However, for the 8th to 11th centuries, images of snakes are most commonly found on the terminal ends of bronze bracelets (**fig. 7, 3**). They are known from Kryvichy burial mound cemeteries. These bracelets are associated with Baltic traditions. They are more common in the territory of the Baltic tribes (Vojtehovič 2019, 243).

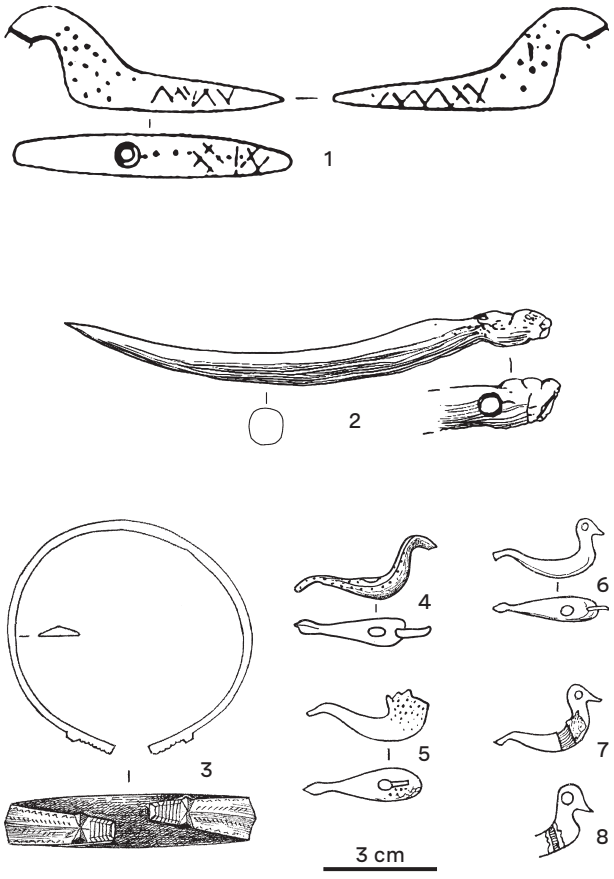

Fig. 7 Bone figurines of birds (**1. 4-8**), hairpin with snakelike head (**2**) and snake bracelet (**3**) from the 5th–11th centuries AD. – (1–2 after Šadyra 2006, tab. 9, 40–42; 3 after Vojtehovič 2019, fig. 38, 1; 4–8 after Štyhaŭ 1992, figs 31, 9–11. 13; 32, 4).

After the 10th century AD, images of ducks disappear from the northern Belarusian archaeological record. In the ethnographic record, various species of birds are encountered – ducks, geese, storks, swans, and chickens. This is also evident when it comes to snake imagery – after the 11th century they, too, disappear as figurines or other representations, remaining only in folklore.

Interpretation and Discussion

There have been numerous attempts by scholars to interpret the Neolithic-Bronze Age waterfowl images in the northern parts of eastern Europe (Gurina 1961, 144–150; Kriva l'cevič 1988, 20–21; Kašina/Emel'ânov 2003, 54. 67–69; Čarnâŭski 2008, 70). We can only speculate about the meaning the waterfowl images held for the prehistoric inhabitants of the Belarusian Lakeland. The return of waterfowl in the spring, the arrival of flocks of ducks, geese, and swans was undoubtedly a significant event in the yearly cycle of the then inhabitants of the Belarusian Lakeland, whose life was tied year-round to the lakes. The birds' return signified the end of the cold and hungry winter, the rebirth of nature and the ar-

rival of kinder, warmer times, just as their departure signified the approach of winter and the beginning of the severe part of the year.

One of the most plausible explanations for the waterfowl images (the »duck«) is a cosmogenesis myth that tells a story of the creation of the universe from a duck's egg, a variation of which can be found in the first rune of the Kalevala (Gurina 1972, 144–150; Čarnâŭski 2013, 5). Such an image of creation can also explain the existence of waterfowl imagery on bone retouching tools: a person who uses such a tool creates a new object, just as the bird creates the universe. The image of the bird can be seen as a medium between heaven and earth, just as the retouching tool was a medium between the human hand and the flint (Kašina 2009, 74). Over time, these ideas were transformed, reaching ethnographic modernity in the form of fairy tales, songs, embroidery, and ritual art (Krival'cevič 1988, 22).

The image of the snake, which was common in the region in the period from the end of the 4th to the first half of the 2nd millennium BC, lends itself to interpretation more reluctantly. It is possible that it is also tied to the specifics of the natural environment – the main location of the settlements was near the shoreline of the shallow overgrown lakes and close to peatland and floodplain meadows, where snakes have always been abundant. Their disappearance for the winter would also have been rather noticeable, especially when one considers the conspicuous bunch of entangled snakes in the autumn, when they are getting ready to hibernate. It is possible that the snake represented certain chthonic forces. It also might have been a reference to certain totemic regional particularities.

The veneration and respect towards snakes, specifically grass snakes, was noted in the territory of modern-day Lithuania and northern Belarus in the first half of the 16th century AD by the diplomat of the Holy Roman Empire, Siegmund Freiherr von Herberstein (Gerberštejn 1988, 195). It is also noted in Belarusian folklore. The legends of the Snake King, as well as the tradition of feeding grass snakes near and in houses, were noted in the ethnographic records as recently as the 19th century and throughout the 20th century (San'ko et al. 2004, 93–94; Lobač 2011, 72).

Representations of ducks and snakes on vessels of the Usviaty culture are the first visual images that can be recognised among the rich ornamental motifs of its pottery. And, as the remaining graphic elements of the ornamentation on the pots and bowls of that time, they likely had a ritual meaning. Later northern-Belarusian culture clay figurines possibly follow the same concept. They can be interpreted as an element of a paired protective amulet, which would have been fixed to the rim of a clay pot. Analogous examples are known from the vast territory of north-eastern Europe (Kašina 2007).

Due to the fragmentary nature of the bone artefacts representing bird heads, their precise identification is impossible. Most plausible, however, is their identification as ritual pommels of retouching tools, analogous examples of which are known from the Volosovo culture on the upper reaches of the Volga river (Russian Federation). They could have also been fragments of amulets or ritual pendants (Kashina/Emelyanov 2020).

Conclusion

In summary, the archaeological record in northern Belarus contains two episodes of the simultaneous presence of artefacts with duck (waterfowl) and snake imagery. The first one dates back to the period between the end of the 4th to the first half of the 2nd millennium BC (the Middle Neolithic to the Early Bronze Age, according to the local periodisation) and ties in with antiquities from the Usviaty and northern-Belarusian archaeological cultures. The second episode, from the 5th–11th centuries AD, relates to people of late Baltic traditions and the Smaliensk-Polack long mound culture – the Kryvichy of the historical sources.

The period of the middle to the latter half of the 2nd millennium BC has seen little research in northern Belarus. At its beginning, a strong influence of the Trzciniec culture is seen, and then there are traces of textile pottery before the appearance of hatched pottery at the turn of the 2nd to the 1st millennium BC and the arrival of the Dnieper-Dvinian cultures a little later. The representatives of the last two cultures are interpreted as the first Balts in this territory. However, we do not have enough information to prove genetic continuity from the Neolithic-Early Bronze Age cultures to the Iron Age ones in northern Belarus, even though a prominent continuity of certain parts of the material culture is known. The manner and details of the cultural transition from the Iron Age to the Middle Ages are also quite disputable. This leads us to two possible conclusions: If a (genetic) continuity of archaeological cultures exists (at any level), then we are dealing with a long-term

existence of the cults of the duck (waterfowl) and the snake, a modern-day interpretation of which can be seen in the local folklore. If the genetic line was broken, then we have two different time periods when similar duck (waterfowl) and snake imagery was created. This could have happened due to the same kind of thinking determined by the same environment, or through the complicated transmission of this idea from other contemporary eastern European cultures. In any case, it indicates that northern Belarus is a region with a long, ancient, and complex cultural heritage, the roots of which possibly stretch back to periods when the Baltic tradition dominated, or even to Proto-Indo-European times.

Bibliography

Charniauski 2016: M. Charniauski, Influences of the Corded Ware Culture in the Belarusian Lakeland (on the Ground of the Kryvina Peat-Bog Microregion). Arch. Lituana 17, 2016, 89–99.

Čarnâŭski 1996: M. M. Čarnâŭski, Тарфяніковая стаянка Зацэнне. In: З глыбі вякоў: Гісторыка-культуралагічны зборнік (Minsk 1996) 132–147.

1997a: M. M. Čarnâŭski, Нарвенская культура. In: M. M. Čarnâŭski / A. G. Kalečyc (eds), Археалогія Беларусі: У 4 т. Т. 1: Каменны і бронзавы вякі (Minsk 1997) 190–206. 272–277.

1997b: M. M. Čarnâŭski, Паўночнабеларуская культура. In: M. M. Čarnâŭski / A. G. Kalečyc (eds), Археалогія Беларусі: У 4 т. Т. 1: Каменны і бронзавы вякі (Minsk 1997) 311–330. 369–383.

2007: M. Čarnâŭski, Касцяныя і рагавыя вырабы на паселішчах Крывінскага тарфяніку (неаліт–бронзавы век) (Minsk 2007).

2008: M. Čarnâŭski, Выявы птушак на кераміцы ў першабытнай культуры Беларусі. Acta Arch. Albaruthenica III, 2008, 67–76.

2013: M. Čarnâŭski, Выяўленчыя элементы арнаментаў на кераміцы ўсвяцкай неалітычнай культуры з крывінскіх паселішчаў. In: U. G. Krasnânski (ed.), Віцебскія старажытнасці: матэрыялы навуковай канферэнцыі (Minsk 2013) 4–10.

2015: M. Čarnâŭski, Мастацкія вырабы з паселішчаў Крывінскага тарфяніка. In: V. U. Ašejčyk / M. A. Plavinski / V. M. Sidarovič (eds), Супольнасці каменнага і бронзавага вякоў міжрэчча Вісły і Дняпра: зборнік навуковых артыкулаў памяці Міхала Чарняўскага (Minsk 2015) 229–254.

Čarnâŭski/Vajtovič 2019: M. Čarnâŭski / A. Vajtovič, Культура шарападобных амфар і яе ўплывы на Беларускім Паазер'і (паводле матэрыялаў Крывінскага тарфяніка). In: M. Szmyt / P. Chachlikowski / J. Czebreszuk / M. Ignaczek / P. Makarowicz (eds), VIP BIMARIS. Od kujawskiego matecznika do stepów nadczarnomorskich. Studia z dziejów międzymorza bałtycko-pontyjskiego. Ofiarowane Profesorowi Aleksandrowi Kośko (Poznań 2019) 609–620.

Černâwskij 2012a: M. M. Černâwskij, Культуры раннего и среднего неолита Белорусского Подвинья. In: G. N. Poplevko (ed.), Материалы и исследования по археологии России и Беларуси: Комплексное исследование и синхронизация культур эпохи неолита – ранней бронзы Днепровско-Двинского региона (Sankt-Peterburg 2012) 88–109.

2012b: M. M. Černâwskij, Поселения северобелорусской культуры. In: G. N. Poplevko (ed.), Материалы и исследования по археологии России и Беларуси. Комплексное исследование и синхронизация культур эпохи неолита – ранней бронзы Днепровско-Двинского региона (Sankt-Peterburg 2012) 160–177.

2014: M. M. Černâwskij, Асавец 4 – ранненеолитическое поселение в Северной Беларуси. In: E. B. Zalcman (ed.), Проблемы балтийской археологии 2 (Kaliningrad 2014) 30–41.

Gerberštejn 1988: S. Gerberštejn, Записки о Московии (Moskva 1988).

Gurina 1961: N. N. Gurina, Древняя история Северо-Запада Европейской части СССР. Материалы и исследования по археологии СССР 87 (Moskva 1961).

1972: N. N. Gurina, Водоплавающая птица в искусстве неолитических лесных племён. Краткие сообщения института археологии 131, 1972, 36–45.

Kashina/Emelyanov 2020: E. Kashina / A. Emelyanov, In bird we trust: bone bird pendants made by forest hunter-gatherer-fishers in the central part of the East European Plain (3500–2700 BC). In: O. Grimm (ed., in coop. with K.-H. Gersmann and A.-L. Tropato), Raptor on the Fist – Falconry, its Imagery and Similar Motifs throughout the Millennia on a Global Scale. Advanced Stud. Arch. Hist. Hunting 2 = Advanced Stud. Ancient Iconography II (Kiel, Hamburg 2020) 403–416.

Kašina 2007: E. Kašina, Наборы лепных зооморфных скульптур в неолите–энеолите лесной зоны Восточной Европы и Финляндии. In: Миф, обряд и ритуальный предмет в древности (Jekaterinburg, Surgut 2007) 125–135.

2009: E. A. Kašina, Г-образные роговые предметы с головами птиц в энеолите лесной зоны Восточной Европы. In: O. V. Ryzhkova (ed.), Ученые записки

НТГСПА. Общественные науки (Nižnij Tagil 2009) 72–78.

Kašina/Emel'ânov 2003: E. A. Kašina / A. V. Emel'ânov, Костяные изображения птиц финала каменного века Мещерской низменности. In: V. P. Čelâpov (ed.), Проблемы древней и средневековой археологии Окского бассейна (Râzan' 2003) 53–70.

Krival'cevič 1988: N. N. Krival'cevič, «Уточка» в верованиях неолитических племен Белоруссии. In: L. D. Pobol'/ A. Z. Tautavičûs (eds), Древности Литвы и Белоруссии (Vilnûs 1988) 18–22.

Lobač 2011: U. A. Lobač, Полацкі этнаграфічны зборнік. Выпуск 2. Народная проза беларусаў Падзвіння. Ч.1 (Navapolack 2011).

Malyutina/Charniauski 2021: A. Malyutina / M. Charniauski, Wild boar tusk artefacts from peatbog sites of northwestern Russia and northeastern Belarus (4th–2nd mill. BC): technology, function, context. In: S. Beyries / C. Hamon / Y. Maigrot (eds), Beyond Use-Wear Traces: Going from tools to people by means of archaeological wear and residue analyses (Leiden 2021) 211–223.

San'ko et al. 2004: S. San'ko / T. Valodzina / U. Vasilevič / L. Dučyc / È. Zajkoŭski / I. Kruk / U. Lobač / A. Proharaŭ / L. Salaviej (eds), Беларуская міфалогія: Энцыклапедычны слоўнік (Minsk 2004).

Šadyra 2006: B. I. Šadyra, Беларускае Падзвінне (I тысячагоддзе н.э.) (Minsk 2006).

Šmidt 2012: E. A. Šmidt, Кривичи Смоленского Поднепровья и Подвинья (в свете археологических данных) (Smolensk 2012).

Štyhaŭ 1992: G. V. Štyhaŭ, Крывічы: Па матэрыялах раскопак курганоў у Паўночнай Беларусі (Minsk 1992).

Vojtehovič 2019: A. B. Vojtehovič, Погребальный обряд населения Полоцкой земли в X–XII вв. (Minsk 2019).

Zajceva et al. 2008: G. Zajceva / M. Černâwskij / P. Dolukhanov / I. Ezepenko / G. Possnert, Новые данные по радиоуглеродной хронологии неолита Беларуси и сопредельных территорий. Acta Arch. Albaruthenica III, 2008, 77–88.

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Tõnno Jonuks

From Dragon to Hare – Animals for Pendants and Animals for Art in Late Iron Age Estonia (9th–13th Centuries)

ABSTRACT

This paper addresses the diversity of animal species used in animal representations during the Late Iron Age in Estonia (9th–13th centuries). Pendants made of animal teeth and bones are compared with animal representations in form of/on other objects. It is first demonstrated that animal representations are above all related to the nobility of the period. It also appears that, despite some coincidences, the animal species selected for tooth or bone pendant production and animals used in art are significantly different. This brings us to a variety of possibilities why some particular species or individuals were valued and selected for pendant production or artistic representation.

KEYWORDS

Animal representation / archaeology of art / pendants / tooth pendants / archaeology of the Eastern Baltic

Introduction

The representation of animals in archaeological finds is an underrepresented field of study in Estonia and in the eastern Baltic in general (e. g. Iršėnas 2009). This has led to the impression that animal representations are either missing or are just a marginal research subject. Moreover, existing studies have often focused on a particular animal, while other species have usually attracted only sporadic interest. For instance, the bear is usually the most favoured and diversely studied one (e. g. Asplund 2005; Helskog 2012; Kirkinen 2017; Grimm 2023), although it is not the most commonly represented creature. Studies on how the representations of different animal species associate with each other are rare (e. g. Jonuks/Rannamäe 2018; Schmölcke et al. 2017), although these could change our perception about the semantics of animal representation.

The purpose of this contribution is not to go deeply into the representations of a specific animal species. Instead, my interest is in analysing which species occur in animal representations in general and how different animal species interact on the symbolic level. The source material varies from animal representations on objects of art to a vast category of pendants made of animal parts. The latter category is broad and includes bones, teeth, and claws, whose context suggests that they probably once had a deeper symbolic meaning than being the mere leftovers from meals or from the processing of animal carcasses. My aim is to demonstrate that animal representation is a vast category and there cannot be a single dominant interpretation. Rather, animals have acted simultaneously in many discourses in past societies, they have been symbols of moral values, social classes, vernacular activities, etc.; thus the interpretation of Late Iron Age animal representation is heavily context-based and can also be controversial.

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Identification of Species

Identifying the species of an animal representation is essential for further interpretations – but this is often complicated, which is demonstrated below. When interpreting zooarchaeological material, archaeologists with a modern education who are also highly competent in biology tend to ascribe identifications that emanate from their own worldview, thus reaching rational and well-proved results. Zooarchaeological methods are used not only to identify osseous collections but also to interpret human-animal relationships, animal husbandry and human society in a broader perspective (see e. g. Russell 2012 and references therein). Based on rational zooarchaeology, it is often assumed that past people approached and organised nature similarly to modern biological approaches, and thus the species used in art should also be identified accordingly. Such an interpretation represents the modern and rational world view, taking »our« biological approach back to the prehistoric past without asking »whether ›our‹ understanding of ›nature‹ is necessarily that of past populations?« (Insoll 2007, 99). Such scientific and rational interpretations direct the identifications to species that exist in our world(view) but exclude creatures that do not, such as dragons or other mythological beasts (see Jonuks 2021 in more detail). The vernacular taxonomies, which also served as a background for producing animal representations in different archaeological periods, were based on different grounds than scientific taxonomy. For instance, according to the scientific taxonomy there are two species of snakes in the eastern Baltic – a poisonous viper (*Vipera berus*) and the harmless grass-snake (*Natrix natrix*) – and in addition the slow worm (*Anguis fragilis*), a legless lizard. Despite the differences in appearance, all three species are understood as a single kind of dangerous snake in folk biology and are subsequently killed (Loorits 1941, 197). Analogously, Bo Jensen (2010, 172) has suggested a similar approach to the snake in the Viking Age – based on linguistic and literary sources, it was demonstrated that the »snake« was an indeterminate denominator, signifying worms, snakes and dragons – all animals with a long and serpentine body, and differences of particular species were important only in certain contexts. Thus, rational zooarchaeology is justified for studying osseous material, but the interpretation of art and symbolic objects assumes that the worldviews, moral values, and vernacular taxonomies of past people are also considered.

The previous example does not mean that the prehistoric taxonomies do not have anything in common with our way of structuring nature. The large mammals in particular are usually safely recognisable in art. In some cases, a distinctive feature has been added to emphasise certain qualities, such as a row of notches on Magdalenian reindeer images to mark the spotted coat of female animals (Castelli 2019). Such marking suggests that for the producer and for the audience the specific identification of the animals was important, and the gender of this species was recognisable. Analogously, animals could have been marked by some details that were known in a past cultural context but are difficult to understand today, leaving the identification of many species in archaeological art unsolved. Such details, which will be labelled in the following as *identifiable features*, also have an essential position in this study.

While osseous material is usually safely identified, it is important to consider that zoological observations have rarely been the purpose of animal representations in prehistoric art. Animals have often been symbols that signify certain ideological, moral or ethical values of human society. The best-known example is the lion, which has been used commonly as a symbol of nobility, even in regions where lions never existed. For instance, the Great Beast in Scandinavian Viking Age ornamentation is a highly stylised quadruped, whose mane-like feature suggests it is a lion (Jennbert 2011, 211). The species has never existed in Scandinavia and the purpose of this imported cultural indicator in art is to signal nobility and not the lion's biological habitat. As an analogy, the descriptions of animals in medieval bestiaries were rather an allegory of human society with a wider purpose of demonstrating human domination over other creatures (Pluskowski 2010). Looking outside Europe, we can find various ways to organise and interpret creatures. For instance, the motives underlying animal classification in China »were not primarily zoological but figured within a larger project to explain the structures of the cosmos as a whole« (Sterckx 2005, 29). Thus, animal representations should not be taken as an accurate copy of the organic world; they have their own purposes, depending on what the particular animal symbolised or meant in this particular society and its culture (Jonuks 2021).

Animal Representations

In terms of animal representations, specific periods can be found in Estonian history. As expected, animals and birds played an important role in the worldview of Stone Age hunters and fishermen, as demonstrated by various figurines and pendants. Representations of animals disappeared after the Late Neolithic (c. 3200 BC), when a new worldview, where social relations were more emphasized than references to animals and nature, became dominant (in more detail: Jonuks 2023). The situation changed in the Viking Age when animal representations appeared again and remained on the scene until the early 13th century. After this, Estonia officially became part of Catholic Europe and local animal representations ceased. This makes the Late Iron Age (c. 9th–13th centuries AD) a specific period, and this contribution focuses on these centuries. As many sites, where animal representations are collected, were occupied over a longer period, an exact dating of many objects is not available. Thus, the dynamism of animal representation within this period is not addressed here; it is limited to a general notion that the highest peak of animal art probably belongs to the 12th–13th centuries, as is also the case with other pendants and artwork (in more detail: Kurisoo 2021).

Even though the following objects represent different categories, such as artwork and pendants, there are some significant similarities. Most of the objects, nearly two thirds, have been collected from central hillforts and settlements (Jonuks/Rannamäe 2018, 170; Kurisoo 2021, 197 tab. 5, 1) commonly associated with the higher ranks of society. Even though these sites have been most extensively excavated, the density of animal representations is clearly higher there than in peripheral settlements or hillforts. Thus, the first conclusion suggests that animal representations are more distinctive for the nobility of these past societies. Only a quarter of the objects have been found in graves, mostly in burials of women. In some cases, this has been a reason to suggest a special connection between female and animal (e. g. Asplund 2005). However, all kinds of objects, and especially ornamental objects, are more common in female burials; so the animal representations, which have often been a decoration or part of it, suit this pattern well (**fig. 1**).

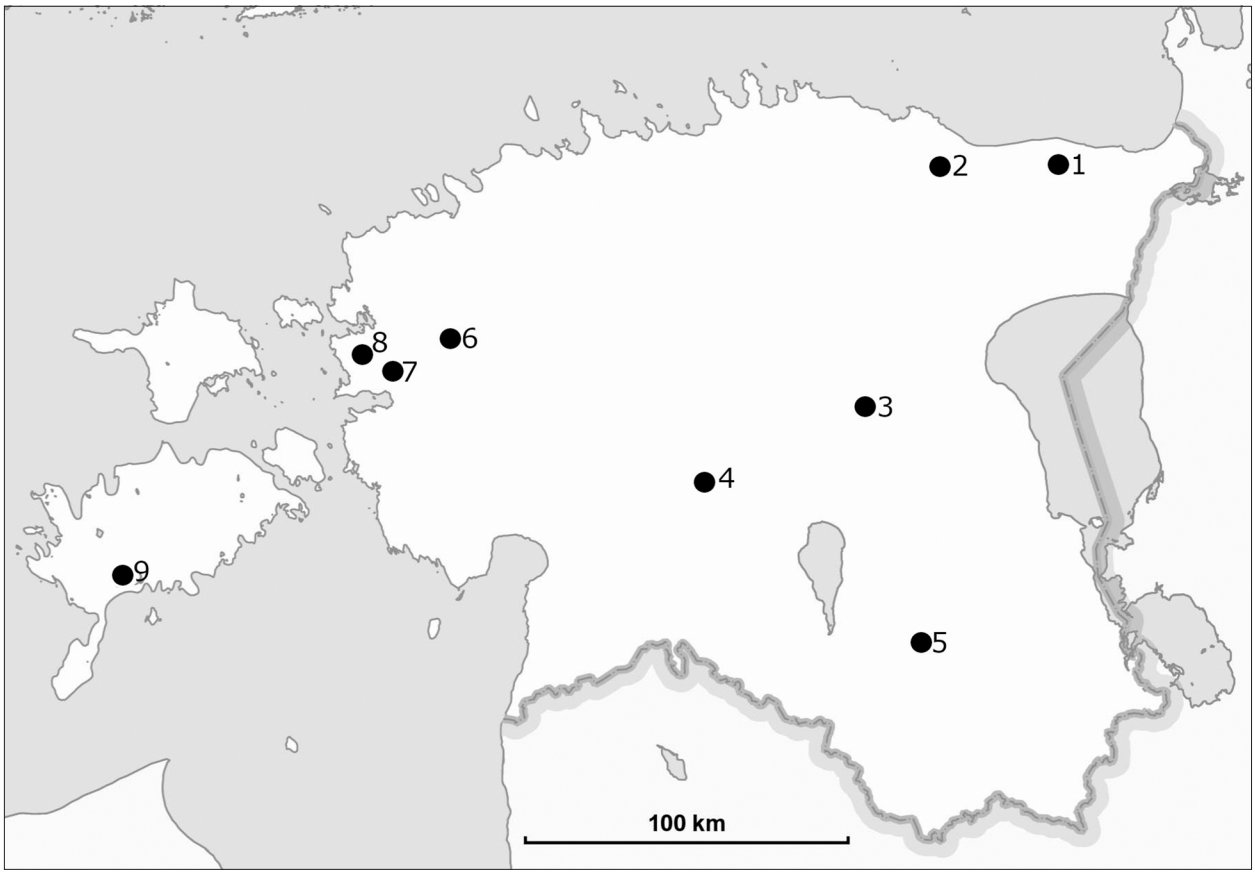

Fig. 1 Map of Estonia with sites mentioned in the text. **1** Kukruse cemetery. – **2** Pada settlement site. – **3** Saduküla settlement site. – **4** Lõhavere hillfort. – **5** Otepää hillfort. – **6** Maidla cemetery. – **7** Ehmja cemetery. – **8** Kolu cemetery. – **9** Mullutu harbour site. – (Map T. Jonuks).

Animals for Pendants

A comprehensive overview of tooth and bone pendants in Estonia from the Early Mesolithic to the Middle Ages has been published elsewhere (Jonuks/Rannamäe 2018) and will be only briefly addressed here. Among the 213 examples from the 9th–13th centuries, 18 different species were identified providing raw material for tooth and bone pendants. Many of them are represented with just a single or a few examples, while four species were clearly more popular than others – pig/wild boar, bear, beaver and dog (**tab. 1**). Such a wide selection of animal species does not support the popular interpretation that pendants can generally be associated with animals that were worshipped or that they all mark a bond between an animal and a hunter. Hunting was not an important part of the economy during the Late Iron Age, and those game animals that are more numerous in osseous collections, such as elk or roe deer, are not represented as pendants at all. Economy does not in general seem to have been an important argument in selecting animals for pendants – cattle breeding played the major role in the supply of meat (and all other animal products) in the Late Iron Age, but only one pendant is made of a cattle tooth and another one of a horse tooth. Domestic animals, except dog and pig, are also little represented in the symbolic culture during the Late Iron Age in Estonia. The scarcity of representations of domestic animals in Estonia is especially significant when considering the importance of horse burials in a circum-Baltic context. The horse is represented most vividly in the burial customs on the southern coast of the Baltic Sea and Scandinavia (e. g. Bliujienė et al. 2017; Gardela/Kajkowski 2023). In Estonia, on the other hand, the horse and horse harness are only rarely represented in graves. The only example of a (partial) horse burial comes from the 12th–13th-centuries inhumation cemetery in Kukruse, where a horse skull had been buried separately in between inhumations. The only animal that was buried together with humans in Estonia was the dog (Mägi et al. 1998). Dog burials are known from Saaremaa island and western Estonia, where the dog has been cremated either on the same pyre with humans or in some cases on a separate pyre (Mägi et al. 1998). Such a symbolic value ascribed to the dog corresponds well with the high number of dog tooth pendants found across Estonia.

The most favoured animal for tooth pendants, however, is without doubt the pig. It is difficult to distinguish between the tusks of domesticated pig and wild boar, and thus the identification of more than half of the pendants remains unclear. This makes it difficult to interpret the meaning of the pendants and the symbolic semantics of the animals. It is possible that the reason why pig tusks are so favoured is partly because these are so large and eye-catching, making them desirable for decoration.

However, tusks might be associated directly or indirectly with wild boars and with the dangerous hunting of this prestigious game. For this reason,

Species	Number of cases
dom. Horse (*Equus caballus*)	1
Dog (*Canis lupus familiaris*)	20
Wolf (*Canis lupus*)	5
Dog/wolf	5
Fox (*Vulpes vulpes*)	3
Lynx (*Lynx lynx*)	3
Carnivore	2
Bear (*Ursus arctos*)	27
Wild boar (*Sus scrofa*)	1
Pig (*Sus scrofa dom.*)	21
Wild boar/pig	35
Mustelid	1
Pine marten/western polecat (*Martes martes*/*Mustela putorius*)	1
Otter (*Lutra lutra*)	6
Beaver (*Castor fiber*)	26
Hare (*Lepus timidus*)	5
Cattle (*Bos taurus*)	1
Seal (Phocidae)	4
Chicken (*Gallus gallus dom.*)	4
Osprey (*Pandion haliaetus*)	1
White-tailed eagle (*Haliaetus albicilla*)	3
White-tailed eagle/golden eagle (*Aquila chrysaetos*)	1
Sturgeon (*Acipenser sturio*)	1
Unidentified	36

Tab. 1 Animal species materials of which were used for the production of pendants during the Late Iron Age in Estonia. – (Data after Jonuks/Rannamäe 2018).

the tusk of a domestic pig may also have served as a symbol of the wild boar.

The third most popular species, the bear, is also associated with dangerous game hunting. There are apparently a number of interpretations concerning the religious and magical semantics of bear teeth and claws used for pendants (see various contributions in Grimm 2023). The distribution of bear tooth pendants, however, seems to support the interpretations associated with power and rank rather than magical connotations, as the majority of bear tooth pendants were found in central hillforts or settlements, and in burial cases they are always associated with wealthy female burials. A comparison between Estonia and Livonia, the two neighbouring regions with a similar material culture and position during the Late Iron Age, demonstrates the difference in the value assigned to bear tooth pendants well. Altogether 29 pendants made of brown bear teeth have been collected from Late Iron Age Estonia on the whole, compared to 122 examples from just the lower reaches of the River Daugava in Livonia (Kurisoo 2021, tab. 3, 1). Such a high number of objects from a limited area raises the hypothesis that these bear teeth could have been trade objects and had been imported into Livonia from other regions.

Surprisingly high is the number of pendants made from beaver astragali (Luik 2010a). In Estonia, these have been found only in the south-eastern part of the country, following the broader tradition of using beaver astragali for pendants in the eastern Baltic and north-western Russia. The lack of beaver astragali in other parts of Estonia is still notable, as the teeth and astragali of other furred animals (hare, pine marten, otter) were used for pendants. It is possible that, for some reason, beavers did not then inhabit the northern and western Estonian rivers (Paaver 1965, 62), although they do so now.

Fur animals are usually represented as bone pendants, but an exceptional example – a unique crossguard from Courland in Latvia – shows hares. The crossguard depicts an anthropomorphic figure standing between two hare figures, both at the size of the human. Romanesque influence is seen in this design (Tomsons 2018, 98) but the repeated hare figure suggests that small animals could also represent broader semantics. Possibly the hare served as a symbolic animal of a person or a family, analogously to a Western coat of arms.

The other animal species – wolf, fox, lynx, seal – are represented by only single examples of pendants. Such a long list indicates that instead of drawing on a common narrative, such as a myth, the choice of these animals for pendants may have instead been individually context-based. The best example of this is a large, pierced sturgeon scale from the Pada Viking Age settlement. Instead of a cultic or religious reason to turn a piece of a fish into a pendant, it seems that it was used as a token to celebrate a successful hunt for a unique prey. Possibly, such vernacular and contextual reasons may have been behind the decisions to choose the teeth of other animals for pendants, too.

In addition to remains of common mammals, chicken bones and eagle claws were also used. Pendants made of white-tailed and/or golden eagle claws, together with those of osprey, have been found across the country in settlement sites and as grave goods. Pendants made of chicken bones were only discovered in two central hillforts, Lõhavere and Otepää. The example from the latter site is a tarsometatarsus with a spur, thus probably from a male individual (Jonuks/Rannamäe 2018, 174).

The deeper semantic meaning ascribed to tooth pendants is demonstrated by bronze copies or objects depicting natural teeth/bone pendants. These bronze imitations occur as single unique finds across the eastern Baltic. Some of these are such accurate copies that it seems that a natural tooth or a bone has been used as a model. An exact bronze replica of an eagle claw has been found in the Maidla stone grave in Estonia (Mandel 2003, 206 fig. 105, 2), and another one is known from the Livonian area in Latvia (Kurisoo 2021, 52). Two bronze objects from Latvia accurately represent beaver astragali (Luik 2010a, 49) and another depicts a bear claw (Spirģis 2008, 206 fig 105, 2). A special category of bronze tooth pendants has been mostly found in south-west Finland and to a lesser extent at sites along the lower reaches of the River Daugava; a few examples are also known from Estonia and Scandinavia (see Asplund 2005 in more detail). These finds are commonly interpreted as bear teeth representations (Asplund 2005 and references therein), although the bronze objects share little, if any, similarities with the actual teeth. As the items seem not to copy the teeth of any real animal, it has been suggested that such bronze objects, originally showing a glittering golden colour, may have represented the teeth of an animal whose parts were desirable but not available, such as a dragon or an oversized snake (see Jonuks 2017 in more detail).

The symbolic usage of animals is not limited to bone and teeth only. The red-painted egg found between the legs of a 12th–13th-century female inhumation in Kukruse is a good example of this. It possibly symbolised the Christian idea of the resurrection of the soul and body adopted by the late pagan society in Estonia (in more detail Jonuks et al. 2018). Animal symbolism is perhaps also represented in the usage of feathers, fur, etc. which do not preserve well (see

Kirkinen et al. 2020). Thus, while interpreting the use of animal body parts for decoration, symbolic or religious purposes, the missing material also needs to be considered.

Animals for Art

The other kind of animal representations are images on pendants or as a decoration on or in the form of various other objects. Here, the media seem to have been of lesser importance, as the same animal species can be represented on various objects of different material. As the focus of this article is on animal species, the animal-style ornament is excluded. There are a number of 10th–12th-centuries weapons and belt details whose decorations include an animal. Often these depictions are highly stylised and thus the speculations about the species of the animal are complex. Nevertheless, the snake/dragon and wolf or lion figure as the main species in interpreting the ornamentation (see in more detail Jets 2012).

The best example of varied representations is the snake. These animals with a vermicular body are depicted on different kinds of objects, such as pendants, brooches, combs, and arm and finger rings. The bodies of the creatures displayed are long and serpentine, indicative of snakes, but with heads that vary. The objects are often highly stylised, and there are only rarely identifiable features to suggest the exact species, although the animal was known to the craftsman and the audience. Snakes were probably depicted quite often, but in some cases the snout and »antlers« suggest that the beast in question really is a dragon (Iršėnas 2009, 126). Dragon images were known at the time in the eastern Baltic, as demonstrated by a figure from Ikškile, Latvia, which clearly represents a dragon and not a snake (Jonuks 2017). Considering that the stylistic differences between worms, snakes and dragons could have been vague (Jensen 2010, 172), the modern question of the exact species can even be irrelevant. All snake-like figures could have been perceived similarly, although with differences in nuances, which may have become essential in particular contexts (**fig. 2**).

Interpretations based on modern taxonomy are also challenged by two staff heads, one cast in bronze from the Kolu stone grave and another carved out of antler from Lõhavere hillfort. Identifiable by a massive beak, they both seemingly depict a bird of prey (Mandel 2003, 64; Luik 2010b and references therein). However, such interpretations ignore that both figures have ears and the one from Kolu has teeth marked on the beak. Such details instead allow the interpretation of both figures as griffins, which had already since the Bronze Age been depicted as

Fig. 2 The curved bow of a penannular brooch from the 12th century resembles the serpentine body of a snake. The opened jaws and displayed tongue suggest the animal is dangerous, while the upward spikes above the eyes indicate this not to be an ordinary snake but its mythical brother, the dragon. – Penannular brooch from Saduküla, south Estonia (archaeological collection at Tallinn University, AI 2618). – (Photo T. Jonuks).

eagle-headed figures with ears in the Mediterranean and the Near East (Kuehn 2011). Similar figures were spread more broadly across the eastern Baltic during the 11th–12th centuries; they are interpreted as the handles or heads of symbolic staffs, and were possibly used as leaders' or chiefs' ensigns (**fig. 3**; in more detail see Jonuks 2024).

While the griffins can be identified by their ears, the other »bird« images are more complicated. Based on morphological features, bird images are classified into different types, while the exact species depicted remain open (Kurisoo 2021, 98–102). Among the Estonian finds, we can discern two main types of bird figurines:

1) three-dimensional bird figurines carved of bone/antler or crafted in bronze with a large belly and often with an opened beak;

2) flat openwork bird figurines made of bronze sheet with accentuated claws, hooked beaks, and sometimes a comb.

Decoration of the first type, cast in copper alloy or carved out of bone/antler, is usually modest, and only one specimen from Otepää hillfort is richly decorated. This fine example is covered with dimples and a rhomboid pattern, possibly depicting plumage, although not identifiable with any actual bird species. Such bird figurines are spread across the east-

Fig. 3 The massive beak of this figure directs identifications towards the eagle, while the zig-zag pattern on the beak and the comb on the head may provide a more nuanced meaning. The circles on both sides, marking the ears, indicate that the animal may be a griffin or a local interpretation of it. – A 12th-century handle of a staff from the 8th–13th-centuries Kolu stone grave, western Estonia (archaeological collection at Läänemaa Museums, HM 8045: 68). – (Photo T. Jonuks).

ern Baltic and western Russia and date to the Viking Age (Kurisoo 2021, 99). As no actual bird species can be identified, it is possible that more than one served as prototypes; thus these figurines are suggested to represent oscine birds. According to modern biology, the list of possible prototypes is long, but it is debatable whether people discerned different species during the Late Iron Age as we do. The most common interpretation associates the figurines with a Balto-Finnic creation myth, in which the world emerges from an egg of a small oscine bird (Valk 1993). However, the bird figurines are not spread exclusively within Balto-Finnic territories but are also found in the area of the Baltic and Slavic peoples in today's eastern Baltic states, north-west Russia, Belarus and northern Ukraine. The spread of Christianity and its tradition of wearing a cross as a religious symbol has been considered to be one of the reasons why the last pre-Christian centuries in the North witnessed such a rich and diverse tradition of wearing pendants (see in more detail Staecker 1999). Possibly, the oscine bird figurines were also inspired by Christian religious symbols, indicating local peoples' manifestation of their worldview and mythology. Similar bird figurines from the lower reaches of the River Daugava and in western Latvia have been interpreted as doves and associated directly with an early influence of Christian culture (**fig. 4a**; see Spirģis 2013).

The second main type of bird figurines, formed of flat copper-alloy latticework, is richly decorated with concentric rings and ribs and represents a clearly different species – the hooked beak and claws are more suggestive of predator birds, whereas the comb on some examples allows their identification as Galliformes (**fig. 4b**). In contrast to the previous type, this one has its main distribution area around the eastern Baltic only (in more detail: Kurisoo 2021). The rich decoration on and the careful polishing of

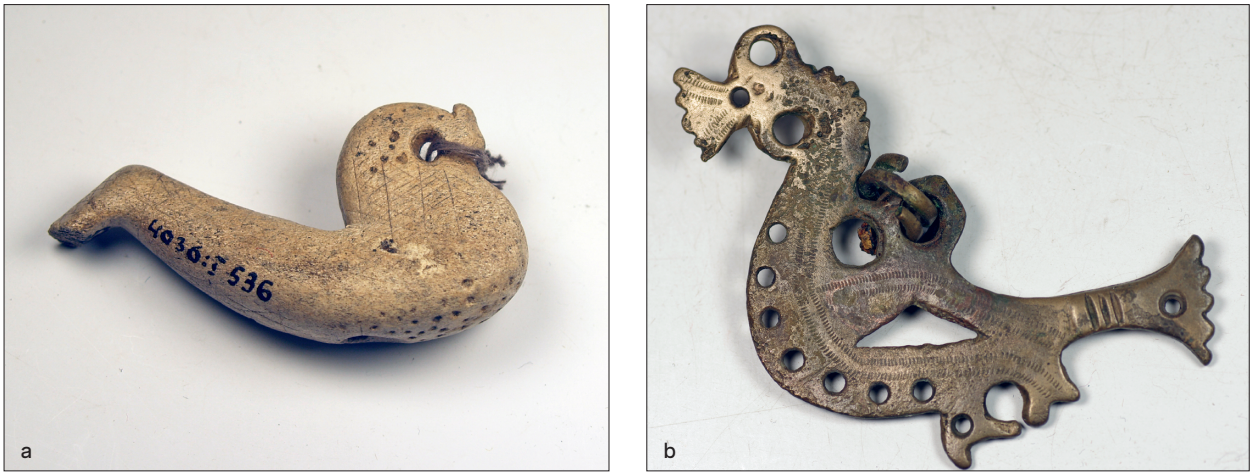

Fig. 4 A distinctive group of bird figurines with opened beak and large breast most likely depict oscine birds. **a** figurine from the 8th–13th-centuries Otepää hillfort, southern Estonia (archaeological collection at Tallinn University, AI 4036: 1 536). – Other bird figurines are made of bronze sheet, depicting a bird with hooked claws and a comb on the head. The opened beak signals that the sound of the bird may have been important, suggesting its identification as a rooster. – **b** pendant from the 11th–13th-centuries Lõhavere hillfort, southern Estonia (archaeological collection at Tallinn University, AI 3578). – (Photos T. Jonuks).

many of these figurines suggest that they were not just ordinary adornments. The possible identification as Galliformes connects these figurines with a male chicken tarsometatarsus from Otepää hillfort that was used as a pendant. If this interpretation is correct, this might be a rare example of how the symbolic meaning of the same species has been expressed in different forms.

Among the other animals represented in artwork in the eastern Baltic and north-west Russia, horses are the most favoured ones, although the animal is not represented in such high numbers in Estonia. Horse-shaped pendants occur in the same types as are common in north-western Russia and represent broader traditions, which may, but not necessarily, be related to the Balto-Finnic peoples. The pendants are stylised pieces of art, which makes the species' identification complicated, and thus their interpretation as horses is rather a consensus among scholars (Kurisoo 2021, 104). The low number of horse images in Estonia, compared to north-western Russia and the areas of the Baltic peoples, is in accordance with the modest representation of the horse as a species in other symbolic contexts, such as grave goods.

Another category of animal representations includes a numerous collection of quadruped figurines, sometimes interpreted as horses, sometimes as dogs (see Jonuks/Kurisoo 2023 in more detail). This group of animal sculptures is part of a broad tradition, which ranges from the British Isles in the west to Russia in the east. As the weight of many of the objects is either 8 g or its coefficient, the figures are interpreted as scale weights (Grinder-Hansen 1997). In many countries, the figures are identified as horses, and this is confirmed by some identifiable features, such as a mane or saddle. The Estonian figurines are somewhat different; they were at least partly produced on site and it is difficult to suggest a single animal species as their prototype. Instead, some figurines can be safely identified as horses, others seem rather to resemble a dog. It has recently been suggested that the actual species might not have been so important and could include both animals, the dog and the horse, but that the symbolism of domination, nobility, and aggressiveness, expressed by many details of the sculptures, was the crucial aspect (Jonuks/Kurisoo 2023). Most of the figures hold their tails and heads high, a clear sign of domination and watchfulness in zoosemiotics. The snout of almost all these figures is divided into three, representing open jaws and tongue, again a sign of an active and aggressive animal. Moreover, nearly half of the figures have a penis, a detail that was unnecessary for practical reasons and an extra effort for the craftsman. It is still debated why some weights were shaped in the form of an aggressive and dominative animal. Possibly the reason lies in the wider ideology of the period, which valued a wealthy, active and aggressive nobility. As the nobility was also involved in long-distance trade and contacts, the latter could be the reason why the fashion of shaping some weights in the form of a mighty horse or a dog spread and was reinterpreted across northern Europe (**fig 5a-b**).

Fig. 5 Some quadruped animal figurines can safely be recognised as horses. **a** figurine found at the 8th–12th-centuries Mullutu harbour site, Saaremaa island, western Estonia (archaeological collection at Saaremaa Museums, SM 10864: 27). – Others are more similar to dogs. – **b** figurine from the 10th–12th-centuries Ehmja stone grave, western Estonia (archaeological collection at Estonian History Museum, AM 554: 777). – (Photos T. Kurisoo/T. Jonuks).

Discussion and Conclusion – What is the Meaning of the Animals?

In previous research history, animals have often been analysed by species. By emphasizing a particular animal, it is easy to reach the conclusion that some creatures were possibly more important, worshipped or honoured for cultic purposes. Taking the entire corpus of animal representations of Late Iron Age Estonia into account, the claim that some species were worshipped does not apply. In fact, it is difficult to speculate about any animal cult during the Iron Age. Instead of religious aspects, animals may contribute to many other discourses of past societies, such as social systems, rank, moral values or aesthetics. For instance, it is intuitively rather expectable to cast vermicular objects in the shape of snake, but this does not mean that the snake-shaped brooches were part of an Iron Age snake cult (see Charniauski, this volume).

Among the animal representations of the Iron Age, three kinds of creatures can be discerned: furred animals, prestigious game species, and creatures associated with rank and moral norms. The first two kinds are represented as tooth and bone pendants, while the latter one appears in art and as animal-shaped figurines. Some pendants, especially those represented by few examples, are possibly associated with a memorable hunt, for instance the sturgeon scale or the single lynx canines. A good example of this is also a pierced seal canine found at Lõhavere hillfort, some 100 km from the sea. The association of tooth pendants and vernacular behaviour is also supported by their find contexts, as most of the objects were collected from the occupation layers of central hillforts and settlements. This suggests that the pendants were produced for a limited period, at a time when the event symbolised by the item was important. Only rarely do tooth and bone pendants occur in a grave inventory. Such a distribution suggests that pendants made of animal remains were usually more significant to persons during their lifetime and it was not necessary to give such pendants to the deceased (Luik 2010a, 50). An impressive exception is represented by a cenotaph in the late 12th/early 13th century cemetery at Kukruse – only a set of belt, knife and belt-bag was buried in an otherwise empty grave. This was a symbolic burial, presumably for a male person whose belt-bag originally also included an unmodified eagle claw. Possibly a personal amulet, it was buried in this case together with the rest of the objects the deceased (presumably) had in his belt-bag.

Looking at animal representations in different media, it is notable how clearly the species are divided. Animals who are well-represented in tooth and bone pendants are not represented in art and vice versa. Out of the four main species used for pendants made of animal remains – dog, pig, bear, beaver – only the dog is probably represented in art, and there is also the unique evidence from western Estonia that a dog was buried deliberately. Pig, either domestic or wild, and bear do not occur in art at all, although these are the main animals represented among the tooth pendants. Also, the beaver, apparently an animal with highly symbolic semantics and represented by pendants made from beaver astragali in south-east Estonia and throughout a vast territory across Europe (Schmölcke et al. 2017), is not seen in art. Likewise, animals depicted in art are rare among the tooth and bone pendants. As an exception, we can find a match between the bronze lattice bird pendants, interpreted as raptors or roosters, and some eagle talons or rooster tarsometatarsi used for pendants. However, such congruities are rare. The most numerously represented animals in art – snakes and oscine birds – have no reference in osseous pendants at all. Also the horse, which is depicted to some extent in art, is represented among the animal pendants only in a single case. Moreover, a number of species used for tooth or bone pendants, from lynx to hare or fish, are represented with single examples only and their remains are possibly related to some unique event. Seemingly, the animal species selected for pendant production and animals represented in art had different background narratives, making interpretations about the past human-animal relationship diverse.

Apparently, the choice of animal species for art comes from ideology – a broad concept, comprising mythology, moral values, ranking systems and other valued qualities shared by the society. Besides mythology, moral values seem to have been even more important in animal art. The species chosen – dog/horse, rooster/raptor, snake/dragon – all refer to the ideology of nobles, valuing aggressiveness, power and dominance. All these qualities are well illustrated by the two griffin (or griffin-inspired) items, possibly from ceremonial staffs, which also symbolise dominance and (royal) power by aggressive and mythological beasts (Jonuks 2024). Part of this aristocratic lifestyle was also hunting, especially the organisation of communal hunting of large, dangerous, and prestigious game animals. This could be the background for an explanation of the popularity of bear canines and pig tusks being used for pendants. It is also connected with the selection of animals shown on objects of art – dragons/snakes, and possibly lions or wolves (Jets 2012), representing the ide-

ology and worldview of the Late Iron Age nobility. In real life, this ideology was reflected by the organisation of communal hunting events, as only the nobility had the ability, skills and power to mobilise others under one rulership (Poole 2013, 72). Thus, hunting became a symbol and metaphor for the nobility to unite and rule the rest of the society (Adams 2015, 22).

To conclude, animal representations were used in various discourses in Late Iron Age Estonia. Some of these were related to a particular animal and the hunting of it, others used animals as allegories and symbols, and some were possibly related to broader narratives, such as a creation myth. None of these creatures, however, were worshipped, whereas all the examples seem to have had some association with rank. Nobility, together with the fitting lifestyle and visual display, seems to be the most crucial factor in interpreting animal representations – the find context, the quality of the work and the nature of the animal representation are all in some way related to it. This raises the question of the association of people of lower rank with animals. Or was the use of animal remains or depictions for symbolic purposes limited to the higher ranks only?

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Bibliography

Adams 2015: N. Adams, Between Myth and Reality: Hunter and Prey in Early Anglo-Saxon Art. In: M. D. J. Bintley / Th. J. T. Williams (eds), Representing Beasts in Early Medieval England and Scandinavia (Woodbridge 2015) 13–51.

Asplund 2005: H. Asplund, The bear and the female. Bear-tooth pendants in Late Iron Age Finland. In: S. Mäntylä (ed.), Rituals and Relations. Studies on the Society and Material Culture of the Baltic Finns. Suomalaisen tiedeakatemian toimituksia: Humaniora 336 (Helsinki 2005) 13–30.

Bliujienė et al. 2017: A. Bliujienė /M. Stančikaitė /G. Piličiauskienė / J. Mažeika / D. Butkus, Human-Horse Burials in Lithuania in the Late Second to Seventh Century AD: A Multidisciplinary Approach. European Journal Arch. 20(4), 2017, 682–709. DOI: 10.1017/eaa.2017.14.

Castelli 2019: A. Castelli, The *rennes se suivant*: a recurrent image association from the Magdalenian culture. Paleo-Anthr. 2019, 1–18. DOI: 10.4207/PA.2019.ART120.

Gardela/Kajkowski 2023: L. Gardela / K. Kajkowski, Riders of the storm: decorative horse bridles in the Early Piast State and Pomerania. In: L. Gardela / K. Kajkowski (eds), Animals and Animated Objects in the Early Middle Ages (Turnhout 2023) 159–192.

Grimm 2023: O. Grimm (ed., in coop. with D. Groß / A. Pesch / O. Sundqvist / A. Zedrosser), Bear and Human. Facets of a Multi-Layered Relationship from Past to Recent Times, with Emphasis on Northern Europe. Arch. Northern Europe 3 = Advanced Stud. Arch. Hist. Hunting 3 (Turnhout 2023).

Grinder-Hansen 1997: P. Grinder-Hansen (ed.), Margrete I. Regent of the North. The Kalmar Union 600 Years (Copenhagen 1997).

Helskog 2012: K. Helskog, Bears and meanings among hunter-fisher-gatherers in Northern Fennoscandia 9000–2500 BC. Cambridge Arch. Journal 22(2), 2012, 209–236.

Insoll 2007: T. Insoll, Archaeology. The Conceptual Challenge. Duckworth Debates in Arch. (London 2007).

Iršėnas 2009: M. Iršėnas, Anthropomorphic and zoomorphic motifs on Balt jewellery. In: A. Butrimas (ed.), Art of the Balts. [Catalogue of the exhibition] (Vilnius 2009) 99–186.

Jennbert 2011: K. Jennbert, Animals and humans. Recurrent symbiosis in archaeology and Old Norse religion (Lund 2011).

Jensen 2010: B. Jensen, Viking Age Amulets in Scandinavia and Western Europe (Oxford 2010).

Jets 2012: I. Jets, Scandinavian Late Viking Age art styles as a part of visual display of warriors in the 11th century Estonia. Estonian Journal Arch. 16, 2012, 118–139.

Jonuks 2017: T. Jonuks, Bronze tooth pendants from the Late Iron Age: between real and fictional zooarchaeology. Norwegian Arch. Rev. 50(2), 2017, 135–148. DOI: 10.1080/00293652.2017.1367838.

2021: T. Jonuks, Dragons, griffins and leucrottas: supernatural creatures in the Eastern Baltic. In: L. Recht / K. Zeman-Wisniewska (eds), Animal Iconography in

the Archaeological Record: New Approachs, New Dimensions (Sheffield 2021) 195–210.

2023: T. Jonuks, Mesolithic art in Estonia: Figurative depictions and geometrical ornament. In: J. M. Grünberg / B. Gramsch / E. Brinch Petersen / T. Płonka / H. Meller (eds), Mesolithic Art – Abstraction, Decoration, Messages. Tagungen Landesmus. Vorgesch. Halle/Saale 26, 2 (Halle/Saale 2023) 387–405.

2024: T. Jonuks, Griffins in the Eastern Baltic Late Iron Age. In: L. Kaljundi / A. Mänd / U. Plath / K. Tüür (eds), Entangled Human-Animal Histories: Practices and Imaginaries from the Eastern Baltic Borderlands (Lausanne 2024) 253–274.

Jonuks/Kurisoo 2023: T. Jonuks / T. Kurisoo, Between the beasts. On the meaning and function of small quadruped figurines from Estonia. In: L. Gardela / K. Kajkowski (eds), Animals and Animated Objects in the Early Middle Ages (Turnhout 2023) 193–204.

Jonuks/Rannamäe 2018: T. Jonuks / E. Rannamäe, Animals and worldviews: a diachronic approach to tooth and bone pendants from the Mesolithic to Medieval period in Estonia. In: A. Livarda / R. Magdwick / S. Riera Mora (eds), The Bioarchaeology of Ritual and Religion (Oxford 2018) 162–178.

Jonuks et al. 2018: T. Jonuks / E. Oras / J. Best / B. Demarchi / R. Mänd / S. Presslee / S. Vahur, Multi-method analysis of avian eggs as grave goods: revealing symbolism in conversion period burials at Kukruse, NE Estonia. Environmental Arch. 23(2), 2018, 109–122. DOI: 10.1080/14614103.2016.1263374.

Kirkinen 2017: T. Kirkinen, »Burning pelts« – brown bear skins in the Iron Age and Early Medieval (0–1300 AD) burials in south-eastern Fennoscandia. Estonian Journal Arch. 21(1), 2017, 3–29.

Kirkinen et al. 2020: T. Kirkinen / J. Riikonen / C. Dove / J. Ruohonen, The identification and use of fur and feathers excavated from the Late Iron Age and Early Medieval (12th–13th centuries) Ravattulas Ristimäki cemetery in Kaarina, Southwest Finland. Fennoscandia Arch. XXXVII, 2020, 45–59.

Kuehn 2011: S. Kuehn, The Dragon in Medieval East Christian and Islamic Art. Islamic Hist. and Civilisation 86 (Leiden 2011).

Kurisoo 2021: T. Kurisoo, Adornment, self-definition, religion: Pendants of the north-eastern Baltic Sea region, 9th–13th century. Stud. Siedlungsgesch. Arch. Ostseegebiete 19 (Kiel, Hamburg 2019).

Loorits 1941: O. Loorits, Endis-Eesti elu-olu II (Tartu 1941).

Luik 2010a: H. Luik, Beaver in the economy and social communication of the inhabitants of South Estonia in the Viking Age (800–1050 AD). In: A. Pluskowski / G. K. Kunst / M. Kucera / M. Bietak / I. Hein (eds), Bestial Mirrors. Using Animals to Construct Human Identities in Medieval Europe. Animals as Material Culture in the Middle Ages 3 (Wien 2010) 46–54.

2010b: Linnupeakujuline sarvest käepide Lõhavere linnamäelt. In: Ü. Tamla (ed.), Ilusad asjad. Tähelepanuväärseid leide Eesti arheoloogiakogudest. Muinasaja Teadus 21 (Tallinn 2010) 127–138.

Mandel 2003: M. Mandel, Läänemaa 5.–13. sajandi kalmed. Töid Ajaloo Alalt 5 (Tallinn 2003).

Mägi et al. 1998: M. Mägi / R. Allmäe / L. Maldre, Viking Age Graveyard at Piila, Saaremaa. In: Ü. Tamla (ed.), Arheoloogilised välitööd Eestis 1997 (Tallinn 1998) 99–116.

Paaver 1965: K. Paaver, Формирование териофауны и изменчивость млекопитающих Прибалтики в голоцене (Tartu 1965).

Poole 2013: K. Poole, Engendering Debate: animals and identity in Anglo-Saxon England. Medieval Arch. 57(1), 2013, 61–82. DOI: 10.1179/0076609713Z.00000000015.

Pluskowski 2010: A. Pluskowski, The zooarchaeology of medieval »Christendom«: Ideology, the treatment of animals and the making of medieval Europe. World Arch. 42(2), 2010, 201–214.

Russell 2012: N. Russell, Social Zooarchaeology. Humans and Animals in Prehistory (Cambridge 2012).

Schmölcke et al. 2017: U. Schmölcke / D. Groß / E. Nikulina, Bears and beavers. »The Browns« in daily life and spiritual world. In: B. V. Eriksen / A. Abegg-Wigg / R. Bleile / U. Ickerodt (eds.), Interaction Without Borders. Exemplary Archaeological Research at the Beginning of the 21st Century (Schleswig 2017) 901–916.

Spirģis 2008: R. Spirģis, Bruņrupuču saktas ar krūšu važiņrotām un lībiešu kultūras attīstība Daugavas lejtecē 10.–13. gadsimtā (Rīga 2008).

2013: R. Spirģis, Kristieši pirms krusta kariem Latvijas teritorijā? Kristietības izplatība Daugavas lībiešu zemēs. Arheoloģija un etnogrāfija XXVI, 2013, 113–142.

Staecker 1999: J. Staecker, Rex Regum et Dominus Dominorum. Die wikingerzeitlichen Kreuz- und Kruzifixanhänger als Ausdruck der Mission in Altdänemark und Schweden. Lund Stud. Medieval Arch. 23 (Stockholm 1999).

Sterckx 2005: R. Sterckx, Animal classification in Ancient China. East Asian Scien., Technology and Medicine 23, 2005, 26–53.

Tomsons 2018: A. Tomsons, Zobeni Latvijas teritorijā no 7. līdz 16. gadsimtam. Latvijas Nacionālā Vēstures Muzeja Raksti 27 (Rīga 2018).

Valk 1993: Ü. Valk, Kust tuli ilmalind I–II. Vikerkaar 2/3, 1993, 21–29, 60–66.

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Further Consideration: Animals in Graves and Animals in Art (»Sarmatia«) and Raptors of Asia

Valentina Mordvintseva

Animals and Animal Images among the Sarmatians

An Analysis of Elite Burials in the North Pontic Region in the Period from the 3rd Century BC to the mid-3rd Century AD

Nay, by Saint Jamy.
I hold you a penny,
A horse and a man
Is more than one,
And yet not many.
William Shakespeare, *The Taming of the Shrew*, III.2

ABSTRACT

The geography and climate of the North Pontic region suited the development of various economic models. A comparative analysis of sacrificial animal remains and images of »potential victims« in elite burial complexes in the territory of »Sarmatia« has made it possible to identify regions with different patterns in the cult sphere that were presumably influenced by the political contacts of elites and the economic model used. The population of »Sarmatia« was thus not ideologically unified; it consisted of several elite groups that can be preliminarily identified as representatives of »nomadic« (Volga-Don, partly Kuban region) and »agricultural« (Crimea, Dnieper and partly Kuban regions) ideologies.

KEYWORDS

Sarmatians / North Pontic region / elite burials / burial rite / animals / animal style

General Remarks

»Sarmatians«[1] is the name that ancient authors applied to various peoples who inhabited the northeast of the ancient oecumene which, in modern archaeological literature, is designated as the North Pontic region. They called this part of the world »Sarmatia«, at least in the period no later than the 1st century BC to the 3rd century AD (Podosinov 2002, 57). The main agents of the cultural-historical processes were, on the one hand, the Greek and later Greco-Roman centres of civilization situated on the northern shores of the Black Sea and, on the other hand, various non-urban hinterland societies, known under specific ethnic names – Aorsi, Siraki, Roxolani, Alani, etc. –, many of which practiced a nomadic way of life. Historical information on these population groups is very limited and selective and can be regarded as a *topos* – a commonplace term – in narratives written by the classical authors, who were alien to the cultures they described (Mordvintseva 2015).

1 The name is of Iranian origin (Tokhtas'ev 2005, 296).

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Although most scholars acknowledge that different population groups inhabited the North Pontic region (Skripkin 2017, 7), they often use the general term »Sarmatian« to refer to all archaeological remains found in this territory. Thus, when anyone refers to the »Sarmatian origin« of some burial custom or type of object, it is not clear either to which part of the vast territory ascribed to the Sarmatians (or occupied by the Sarmatian archaeological culture) one should apply this reference, nor how often this feature is represented there and what phenomenon its usage might reflect (ethnicity?, economy?, prestige?, political identity?, geographical conditions?). In this respect, the general definition of a feature or a type of object as »Sarmatian« seems to be meaningless. It does not add anything new to the *topos* already created in the archaeological literature about the Sarmatians.

Meanwhile, one can map archaeological features that are characteristic for cult practices, or which are group signs and symbols, and then see regularities in processes and structures from particular times and places. Thus, one can indicate some areas inside the »Sarmatian territory« that were possibly inhabited by concentrated self-identified population groups who were represented by their elites. In doing so, I would like to analyse the practice of burying sacrificed animals (or remains of them, respectively) in the elite burial structures of the non-urban population of the North Pontic region and to compare it with the animal images found in the same territory. A special attitude of the »Sarmatians« to animals and their images in a form of »animal style« already constitutes a part of the archaeological *topos*. This was expressed most directly by Michael Rostovtzeff: »They often saw these battles between animals and they loved to reproduce them« (Rostovtzeff 1973, 55).

The research presented here is based on 557 funerary complexes of the »barbarian« elite[2] from four chronological periods: 1) 3rd to 2nd century BC; 2) 1st century BC; 3) from the 1st to the mid-2nd century AD; 4) from the mid-2nd to the mid-3rd century AD. They were found in four regions of the northern Black Sea: the Lower Dnieper (10/10/42/17 burial assemblages[3]), the Crimea (21/30/49/17), the Lower Don-and-Volga (25/35/69/29), and the Kuban (52/54/66/32). I have included these complexes in a database according to the presence of prestige objects known from written sources, ancient images and archaeological contexts.

Sacrificed Animals in Funerary Rituals

The use of animals in funerary rituals is an act of sacrifice that involves: 1) the sacrificer (individual or collective) wishing to make an impact and instigating it, and/or their representative (a professional attendant in the sacred sphere), 2) the object of offering, i. e. the purpose for which the sacrifice is made, and 3) the victim itself (Mauss 2000, 16–24). In the course of the sacrifice, the victim, or part of it, may be either consumed or left untouched (Lowry 2005, 23). What was left of the animal either belonged completely to the sacred world, or completely to the profane world, or was divided between both (Mauss 2000, 46).

The archaeozoological study of (sacrificial) animal remains can provide a variety of analyses: a comparison of species composition, sex and age of sacrificial animals, detection of pathological changes and their identification, identification of traces of lifetime violent influences and traces of the dissection of corpses, seasonal dating of animal slaughter, and many more (Zdanovich 2005, 9). However, the number of animal bones from the funerary contexts of the northern Black Sea region studied by specialists is small and contains regional peculiarities. The only characteristics available for a comparative analysis are in most cases the species of the sacrificial animal, its position in the grave or graveyard and the form of its presentation in the sacred space. We can compare these characteristics with the data from standard burials and settlements (if present) and use them to assess the complexity of rituals being performed in various parts of the North Pontic region.

In connection with the death and burial of a member of the social group, the following may be chosen for sacrifice: 1) the least costly species (i. e. the most abundant or readily available animals used in daily subsistence and/or the best suited to crowd feeding), 2) the most costly species (the least abundant and/or best suited to elite feasting), or 3) species or taxa with particular symbolic qualities (Lowry 2005, 28). Accordingly, the choice of an offering could take place using the alternative models: economic, costly signalling (prestige), and symbolic.

2 For analysis, burial assemblages that contained special prestige markers known from the written, pictorial and archaeological sources were chosen.

3 Numbers in brackets represent the quantity of analysed elite burial complexes for the four chronological periods described before.

Sacrificial animal remains can be found inside the grave or within the complex funerary structure (»accompanying inventory«), or outside the grave and the complex funerary structure, for instance, within the necropolis, but without any outer visible connection with the specific grave (»adjacent inventory«; for terms, see Smirnov 1997, 30–31). In the first case, one could argue with certainty that the sacrifice of the animal and the burial happened simultaneously. In the other case, there is a high probability that the animal was sacrificed during post-burial rites and might not be connected with a specific burial.

The remains of a sacrificed animal can be presented in the form of a »full animal«, a »partial animal«[4], a »part of the animal«[5], a »symbolic part of the animal«[6] and a »stuffed animal«[7]. The alienation of the »full animal« for the sacrifice means the non-participation of the sacrificers in its consumption. In this case, we can suppose the »symbolic« and »costly signalling« sacrificial strategy. The presence of a »symbolic part of the animal« in the grave should not necessarily mean an animal sacrifice performed in connection with the funeral.

Lower Dnieper

First Period

The archaeological sites of the region are represented by ritual deposits[8] (**fig. 1**), i. e. individual insertions into already-existing barrows and settlements (Mordvintseva 2017). Elite burial assemblages contain ritual deposits (often called »hoards«), one of the main components of which was a horse harness. As a rule, they do not contain animal bones. Only in one case (10 %)[9], outside the hoard proper, but under a mound, were the leg bones of horse and cattle found next to stone fragments interpreted as an altar (Beylekchi 1998, 8).

Second Period

Flat necropoleis appear in addition to ritual deposits and single barrow burials (**fig. 2**). Elite burial complexes are represented by ritual hoards and several barrows as well as flat graves[10]. In one flat burial (10 %), a scapula of a »large animal« was found together with a knife (Gudkova/Fokeev 1984, 8–10).

Third Period

The composition of recorded archaeological sites changes significantly (**fig. 3**). There are no ritual deposits anymore, and barrow burial grounds appear. The animal remains come from nine elite burials (21 %). In the barrows, mainly the bones of sheep/goat, usually a front leg with shoulder blade, often together with a knife, have been found (Mantsevich 1982; Simonenko 1993, 64–66; Kostenko 1993, 38–41. 48–50. 69). In single cases, the remains of a river turtle[11], a fish vertebra, a bear fang, and a claw of a large animal (bear?) are represented (Kostenko 1993, 38–41; Sanzharov 1986; Simonenko 2008, 60).

A cattle (leg?) bone was lying on a red-slip dish in one flat grave and, in another, a deer tooth was found among »amulets« of the female burial inventory (Vyaz'mitina 1972, 22, 59). In addition, in flat necropoleis, animal bones were also discovered as »adjacent inventory«, in separate structures or pits, as well as in the entrance pits of catacombs (Vyaz'mitina 1972, 169). In the Zolotaya Balka necropolis, the bones represent a »full animal« (sheep, horse, dog), a »partial animal« (horse), and a »part of animal« (cattle, horse) (Vyaz'mitina 1972).

Fourth Period

Two indeterminate animal bones were found on each side of an interruption in the ditch surrounding the elite burial (6 %) in a barrow (»adjacent inventory«) (**fig. 4**; see Gudkova/Fokeev 1984, 42–44).

Comparison

Comparing elite burials with standard ones, we can notice similar trends in the sacrificing of animals within burial sites of the same type. For flat burials, horses and cattle were chiefly used as sacrificial animals, while in barrow burials of the third period sheep/goat bones predominate. The placement of a »part of the animal« is found in all types of burial sites. At the same time, a »full animal« and a

4 A »partial animal« is defined as »an artificially organised lay-out of the undivided head and distal parts of an individual animal in the absence of a hide« (Zdanovich 2005, 13).

5 A part intended for consumption.

6 A part not intended for consumption.

7 As a »stuffed animal« I understand an imitation of a whole animal or its part, made of organic materials (e. g. sewn from hide and stuffed with straw).

8 Ritual deposits are burial goods assemblages not containing any human remains.

9 Here and below, this is the percentage of assemblages with animal bones out of the total number of elite burials in the region and period under consideration.

10 A »barrow grave« is a burial in a barrow mound, a »flat grave« is a burial without a barrow mound.

11 It is not certain that a turtle was placed deliberately into the grave.

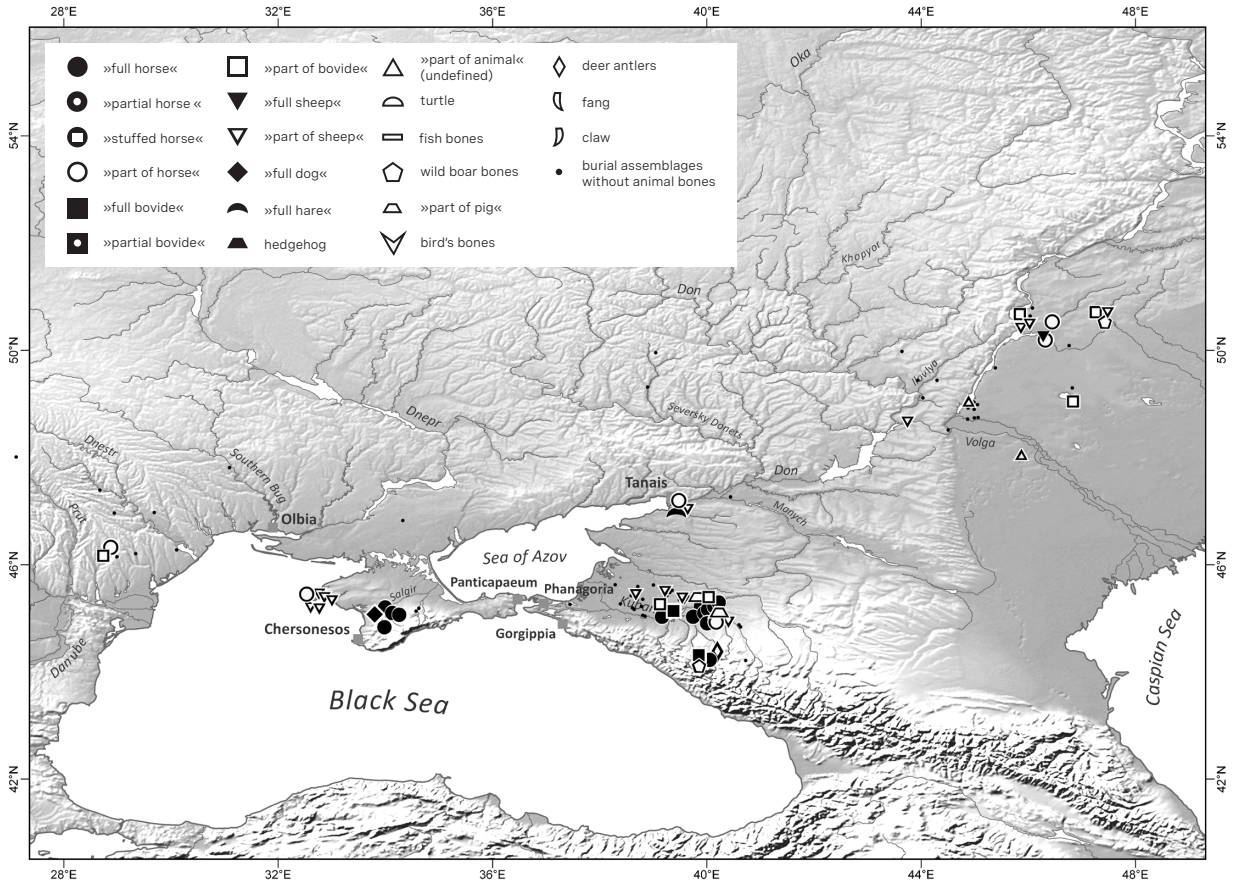

Fig. 1 Animal bones in the elite burial assemblages of the North Pontic region, 3rd to 2nd century BC. – (Map V. Mordvintseva).

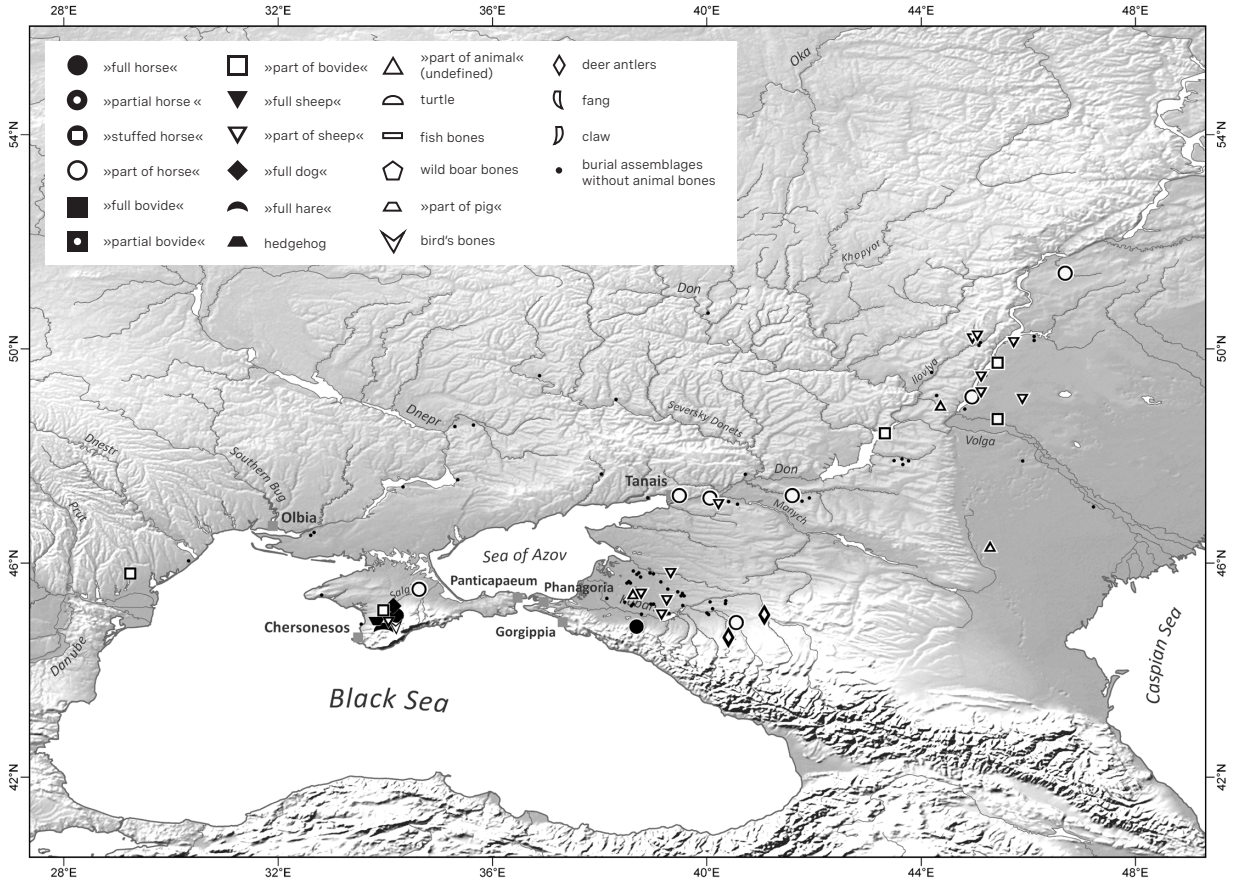

Fig. 2 Animal bones in the elite burial assemblages of the North Pontic region, 1st century BC. – (Map V. Mordvintseva).

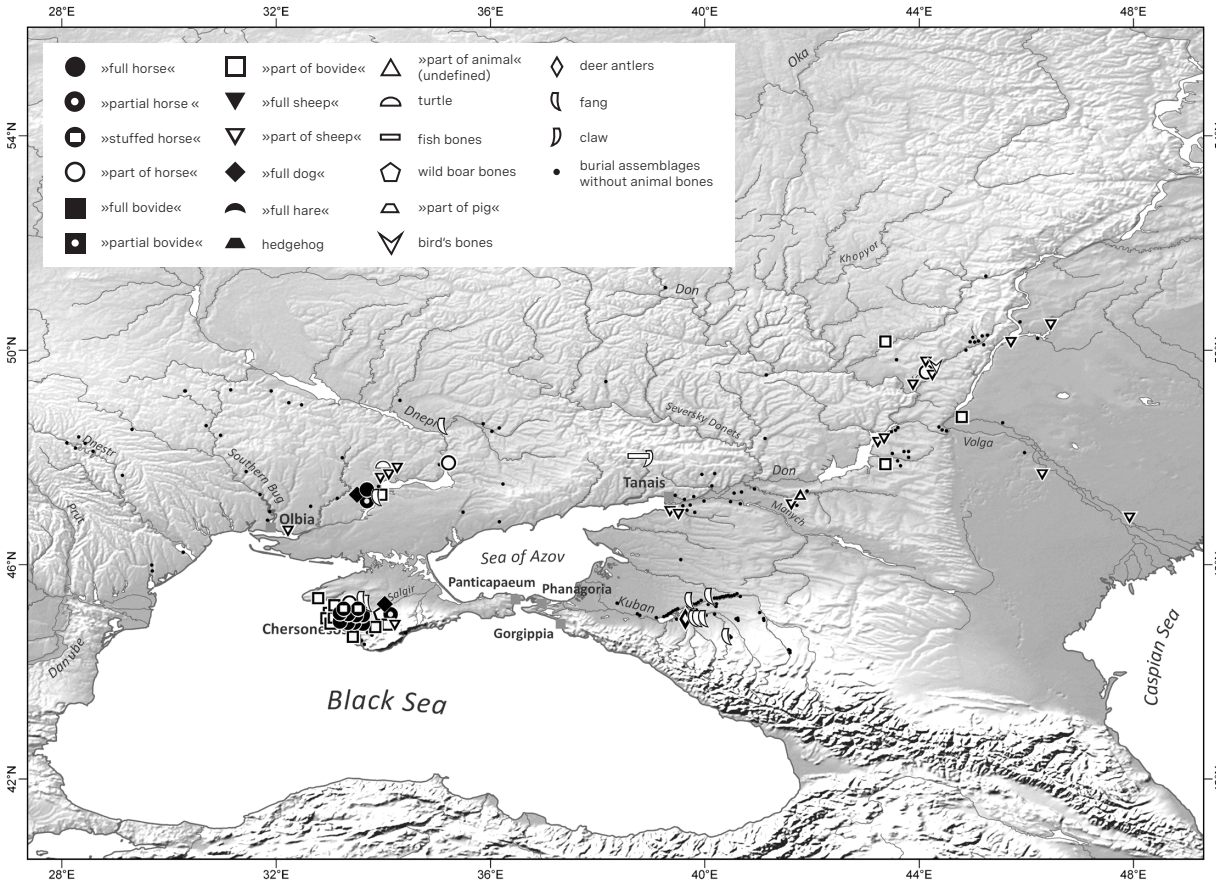

Fig. 3 Animal bones in the elite burial assemblages of the North Pontic region, 1st to mid-2nd century AD. – (Map V. Mordvintseva).

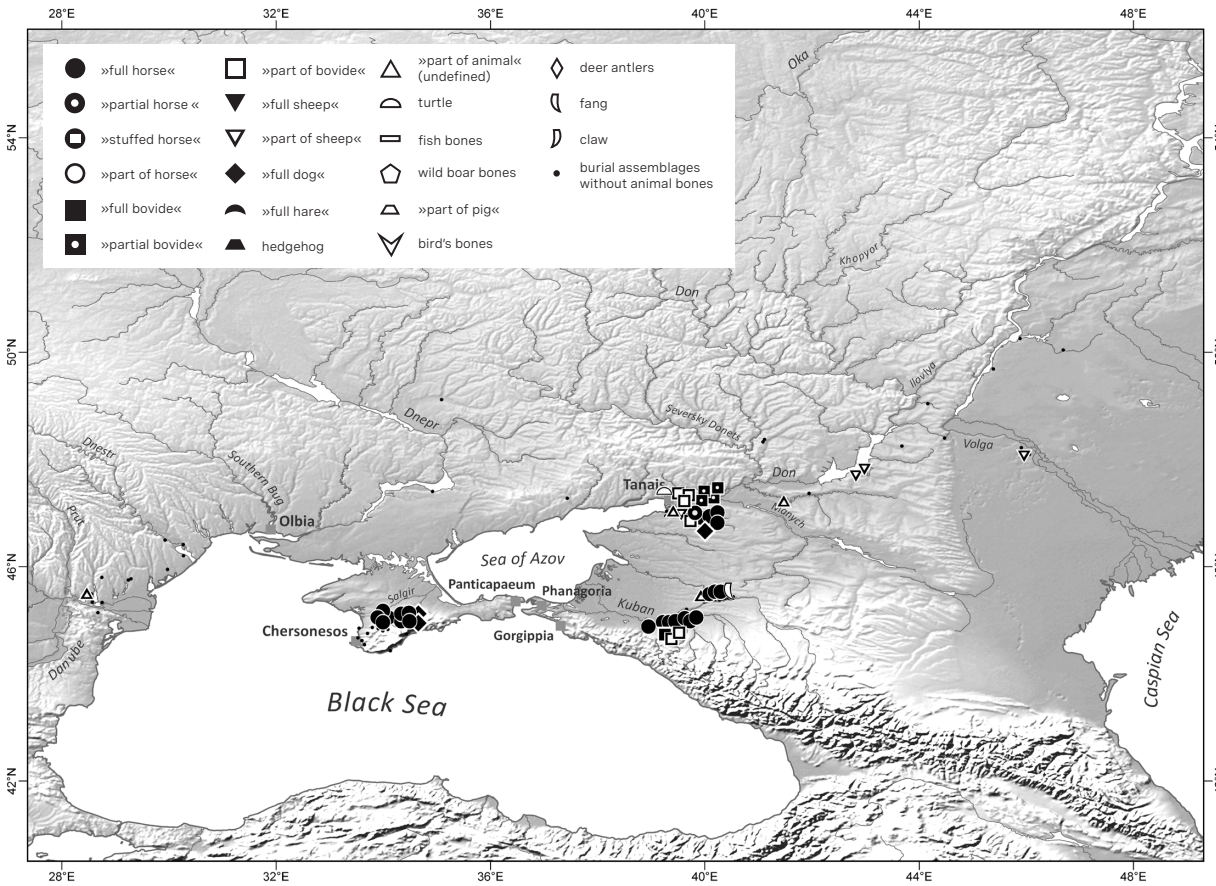

Fig. 4 Animal bones in the elite burial assemblages of the North Pontic region, mid-2nd to mid-3rd century AD. – (Map V. Mordvintseva).

»partial animal« are noted only in flat necropoleis of the third period.

These results can also be compared with the data from settlements, which were analysed, unfortunately, only in a rather broad chronological form, from the 2nd century BC to the 2nd century AD (Bylkova 2007, 104, 112). At the hillforts of Annovka and Lyubimovka, cattle are represented by 32.14 % and 23.66 %, sheep/goat by 28.57 % and 42.75 %, pig by 19.64 % and 15.27 %, horse by 12.5 % and 12.98 %, and dog by 7.15 % and 5.34 %, respectively (Zhuravlyov 1991, 75. 80–86). Wild animals (reindeer and wild boar predominate) make up almost one third of the total number of individual animals at Annovka, and less than one sixth at Lyubimovka. At the Znamenka and Gavrilovka hillforts, sheep/goat bones account for 34 % and 35.5 % of individuals, cattle for 26 % and 28 %, pig for 12 % and 17 %, horse for 20 % and 14 %, and dog for 8 % and 5.5 %, respectively (Pogrebova 1958, 155. 225). Deer and wild boar represent 26.5 % and 20 % of the wild animals, respectively. At Zolotaya Balka hillfort, bovids dominate both in terms of bones and individuals, accounting for 36 %, sheep/goat for 28.3 %, horse for 25.6 %, pig for 5.6 %, dog for 2.2 %, and one camel bone was found, too. Wild animals account for 10 %.

Thus, in the case of an individual funeral, the sacrificial animals were often chosen from among the most widely consumed domestic animals (cattle and sheep/goat). This can be explained by the »economic« strategy. However, the absence of pigs among the funerary sacrifices is remarkable and should probably be attributed to certain ideologies.

Horses played a special role in the thanatological doctrine of the settled population, since they were used for collective (post-funeral?) rituals performed at the flat necropoleis. The sacrifice of horses and dogs, especially in the form of a »full animal«, could be carried out as part of both »prestigious« and »symbolic« strategies.

Wild animals were quite often consumed in daily life, which we see from the settlement materials. However, in most cases their symbolic parts (the fangs and claws of predatory animals and deer teeth) are found in the barrow burials (i. e. of the »nomadic« population) of women and children, presumably as amulets.

Crimea

First Period

Among the archaeological sites (**fig. 1**) there are settlements, flat necropoleis, a stone mausoleum with elite burials, single burials in barrows and barrow stone crypts (Mordvintseva 2020, 34–35). Animal bones come from eleven elite burial complexes (52 %). In the catacombs with multi-layered burials in the Belyaus flat necropolis, »animal parts« and »symbolic parts of an animal« were found: sheep/goat (in one complex, a shoulder blade with ribs and jaw; in five cases, a leg bone, together with a knife) and a cattle femur and wild boar tusks (Dashevskaya 2014). In the mausoleum in Neapolis Scythica, indeterminate animal bones were found (Pogrebova 1961, 191–193). Outside the sarcophagi containing the inhumations, four horses were buried together with elements of a harness and funerary inventory (a red-slip cup, a fragment of a bronze ring), as well as a dog skeleton (Pogrebova 1961, 212–213). A complete horse skeleton with elements of a harness was lying on its side in the entrance pit of a catacomb dug into a Bronze Age barrow near the village of Chisten'koe (Zaytsev/Koltukhov 2004).

Second Period

The composition of archaeological sites, in general, remains the same (**fig. 2**; Mordvintseva 2020, 36). The mountain sanctuary at Gurzufskoye Sedlo began to function (Novičenkova 2013). Animal bones come from six elite burial complexes (20 %). A horse vertebra together with a knife and a boar tusk were found in the earthen catacomb in Belyaus (Dashevskaya 2014, 32–33). In the mausoleum in Neapolis Scythica, animal bones were found in four burials: a dog skeleton (male burial 68); the skeletons of a hare, a bird, and a hedgehog[12] (female burial 4); uncertain animal bones (female burial 67) and a cattle leg bone (male burial 16) (Pogrebova 1961, 196. 202. 205. 210). In the entrance pit of earthen catacomb 19 in the Eastern necropolis (Neapolis Scythica), containing a female and three children's burials, two complete horse skeletons were lying on their sides (Symonovich 1983, 36–37). In the mound of the Nogaychik Barrow, there was a ritual site marked by a burnt layer with an unburnt entrance containing burial no. 5, an ostentatious female burial, in the centre and a pit with two horse skulls, each with harness, by the entrance (Mordvintseva/Zaitsev 2003, fig. 2).

12 It is not certain that the hedgehog and bird were placed deliberately into the grave.

Third Period

The spectrum of archaeological sites has slightly changed (**fig. 3**; Mordvintseva 2020, 36–38). On the Crimean south coast, flat necropoleis with cremations appear (Mordvintseva et al. 2016). The sanctuary of Eklizi-Burun began to function on Mt Chatyr-Dag (Lysenko 2013). In the flat necropoleis in the foothills zone, along with earthen catacombs containing multi-layered burials, individual burials are widely spread. Animal bones come from 20 elite burial complexes (41 %). In the mausoleum in Neapolis Scythica, a cattle leg bone lay near the head of the buried person (Pogrebova 1961, 209). Elite burials in the Eastern necropolis contain: indeterminate bones of domestic animals (grave 14) and the bones of cattle and wild boar, as well as two dog skeletons on top of the burials (grave 75), and the skull and legs of a horse (a »partial animal«) in the entrance pit of catacomb 23 (Symonovich 1983, 34–37. 50–52). Cattle leg bones were found in burials in the Belbek-4 and Belyaus necropoleis (Gushchina/Zhuravlyov 1999, grave 172; Dashevskaya 2014, 21–22).

Various forms of animal sacrifice are recorded in the Ust'-Al'ma flat burial ground. As a rule, cattle leg bones, along with a knife, had been laid in the graves (Loboda et al. 2002, 317–337; Puzdrovskij/Zajcev 2004, 229–239. 246–253; Puzdrovskiy/Trufanov 2017a, 19–20; 2017b, 24–26. 38–40. 67–68. 76–78). Wild boar tusks were found in burials with a »female« inventory (Puzdrovskiy/Trufanov 2017a, 22–25; 2017b, 8–11). Special rituals concerned the horses, whose burials have been studied in a number of cases (males of *Equus equus* or hybrid forms of *Equus equus* and *Equus gmelini Antonius* of small stature; Puzdrovskij/Zajcev 2004, 262). In many cases, it is not possible to associate them with a specific funerary complex. As a rule, the horse is lying on its belly, with its legs tucked up and its head placed on a shelf cut in the ground for this purpose. In about one third of the cases, the horses are bridled. Apart from the burying of a »full animal« as an »adjacent inventory«, several cases of the making and burying of a »stuffed animal« were investigated, thanks to the specific features of the soil preserving the organic remains so well. These horse »dolls« are life-size, made of leather and stuffed with chopped reeds. One bridled »doll« in the form of a full-sized animal was found in a catacomb with a female inventory (Zaytsev 2000), another one in the form of a horse's head, also bridled, was lying among »male« grave goods on top of a wooden dish with a cattle thigh bone, a wooden bowl and a knife (Zaytsev/Mordvintseva 2002).

Fourth Period

Flat necropoleis appear in new territories, and karst caves were also used for burials now (**fig. 4**; Mordvintseva 2020, 38–39). Animal bones come from six elite burial complexes (35 %). All of them are represented by a cattle bone (a femur, judging by the images in the illustrations) with a knife (Gushchina/Zhuravlyov 1999, grave 215, 285; Khrapunov et al. 2001, 123–127; Zaytsev/Mordvintseva 2007; Khrapunov 2013a, 23; Puzdrovskiy/Trufanov 2017a, 12–13. 17–18). At the burial sites of Neyzats, Opushki and Neapolis Scythica, there are separately located graves of horses, which had been laid on their sides and on their stomachs with their heads, quite often in a bridle, placed on a special shelf. In rare cases, a horse skeleton was placed in the entrance pit of the burial structure (Khrapunov 2013a, 24). Within the territory of the Opushki burial ground, more than 50 horse burials in separate ground pits form a compact plot. Often dogs' skeletons accompanied the horses (Polit 2019; Khrapunov/Shabanov 2021).

Comparison

Most of the elite burials come from the foothills geographical zone of the Crimea. Standard burials in this zone show similar patterns for animal sacrifices in the »accompanying inventory« within the same site. There are similar species (sheep/goat and, less frequently, cattle, in the first period, and cattle from the second to the fourth period) and similar forms of their presentation (a »part of the animal«, usually a leg). The bones of wild species are noticed in singular cases. As a »symbolic part of an animal«, wild boar tusks have been found among amulets in graves of all periods. In some flat necropoleis, which apparently held an elite status, »full animals« (horses and dogs), »partial animals« and »dolls« (horses) are recorded. In the necropoleis of the capital's fortress (Neapolis Scythica), sacrifices of bridled horses have been practiced in all chronological periods. In the third chronological period, horses were buried in the necropolis of Ust'-Al'ma, and in the fourth chronological period in the necropoleis of Neizats and Opushki.

Burial grounds have been less studied in the mountain and south coastal geographical zones, so there is a paucity of osteological material. In the Glazastaya cave necropolis (on the eastern edge of the mountain landscape zone), which dates to the 3rd century AD, the skulls of rams, goats, and deer were set on stones in the anteroom of the karst cavity, as well as near the remains of the deceased (Lysenko 2003,

90 fig. 4, I). In the cave necropolis of Ai-Nikola (south coastal zone), dating from the late 2nd to 3rd century AD, the almost complete skeletons of two hares were recorded, each accompanying a human burial (Myts et al. 1999, 170. 177 figs. 3C. 4C).

In addition to burial grounds, animal bones come from sacral and profane complexes in settlements and sanctuaries.

Neapolis Scythica is the largest and best-studied fortress located in the centre of the foothills zone. Its stratified 2nd- and 1st-century BC cultural layers contained the remains of cattle (15.7 %), sheep/goat (39.2 %), horse (19.8 %), pig (17.2 %), dog (7.5 %), and donkey (0.6 %). Hunting prey remains were absent. In the 1st–3rd-century AD layers, the bones of cattle (26.4 %), sheep/goat (27.3 %), horse (18.2 %), pig (15.4 %), dog (7.3 %), saiga (1.8 %), kulan (1.8 %), camel (0.9 %), and deer (0.9 %) were found. Hunting prey totalled 4.5 % (Tsalkin 1960, 94–95. 104 tab. 39 appendix 16). Among the materials from the Barabanovskaya Balka settlement, which dates from the 2nd to 4th century AD, the remains of 13 mammal species have been identified: cattle (9.5 %), sheep/goat (34.5 %), pig (20.2 %), horse (15.5 %), donkey (4.7 %), kulan (3.6 %), saiga (3.6 %), dog (1.2 %), domestic cat (1.2 %), hare (1.2 %), fox (1.2 %), ferret (1.2 %), wild boar (1.2 %), and deer (1.2 %) (Khrapunov 2016, 34–36).

In Neapolis Scythica, sacral structures have been also studied. Within the public cult buildings of the 2nd century BC (first period), pits with the bones of sacrificed (?) animals were found, and there were the almost complete skeletons of five sheep aged 1.5–2 years (Zaytsev 2004, 28). Deer skull fragments with antlers and a cluster of small sawn-off antler fragments were found in the corners of two buildings belonging to the second period (Vysotskaya 1976, 64; 1979, 168–169). The fourth period yielded several assemblages: a pit with the complete skeletons of four cows; a pit with 400 animal bone fragments (eight pigs, five sheep/goats, one cattle, one horse) together with two miniature cult vessels and pits with sacrificed (?) animal bones in hand-formed pots (Vysotskaya 1976, 61–62; 1979, 165–168 figs 79–80). One such pit contained the bones of five small bovines, twenty chickens and three quails. Some of these assemblages were located at a special site enclosed by a monumental wall (Vysotskaya 1976, 62–63).

In the mountain zone, several sacral structures are known. At the sanctuary of Eklizi-Burun, located on the top of Mt Chatyr-Dag, mainly parts of domestic animals were found (Lysenko/Serdyuk 2023). The ratio of species in the studied part of the archaeozoological complex for the »lower« layer (period 3 according to the scheme used in this contribution) is: cattle (8.4 %), sheep/goat (46.2 %), pig (45.3 %), horse (0.1 %); for the »upper« layer (period 4): cattle (12.3 %), sheep/goat (41.1 %), pig (46.1 %), horse (0.2 %), dog (0.1 %), and deer (0.2 %). Among the bones, teeth and skull fragments dominate. This is the basis for the assumption that the complete heads of small animals were brought to the sanctuary, and the heads of large animals were probably processed somewhere else, whereas only the lower jaws were brought to Eklizi-Burun. The general characteristics of a part of the osteological collection of another mountain sanctuary, Gurzufskoye Sedlo, are largely similar to the data obtained from Eklizi-Burun (Novichenkova 2002, 19. 36).

The settlement structures of the south coastal zone are practically unstudied. There is some information about faunal remains from two sites. In the seaside settlement of Chugunun-Kaya, dating from the 2nd to the 3rd century AD, fish bones and marine mollusc shells were found (Lysenko 2005, 230–236), and in the cultural layers of the Chatyr-Dag-2 settlement, dating to the first half of the 2nd century AD, c. three dozen animal bone fragments were studied (pig and cattle). Structure XI contained small fragments of the bones of a cow aged over three years, a pig, and a young sheep (Lysenko 2010, 264–265).

Representative material was obtained from sacral structures in the south coastal zone. The osteological remains found in the Taraktash cult complex, dating from the first to the second half of the 4th century AD and located near the northeastern border of the zone, contained the limb bones and sometimes the skulls of wild (9 %) and domestic (83.8 %) animals. Domestic species are represented by cattle (3 %), sheep (26 %), pig (3 %), horse (0.3 %), dog (1.1 %), and rooster (50.4 %; Lysenko 2009, 388). At the sanctuary of Autka, in the southwestern part of the zone (late second to first third of the 4th century AD), a compact accumulation of sheep, pig and dog jaws lying in a dense layer was found (Lysenko 2012).

Comparing the data discussed above, we can state significant regional differences in the choice of a species for ritual slaughter and in the manner of its sacrifice. In the south coastal and mountain sanctuaries, the craniological parts of sheep/goat and pigs prevail, while, in the burials in this zone, the bones of sacrificial animals are recorded in isolated cases (cave necropoleis). It is possible to assume that the strategy used was mainly »economic« when sacrificing at sanctuaries but »symbolic« in some cave necropoleis.

Cult practices of the population in the foothills zone differ from those in the mountain and south coastal zones, both in the choice of the sacrificed animals and in the form of their presentation. In the

first chronological period, sheep/goats occupy the main place among species found in graves and, from the second to the fourth period, it is cattle. In general, this can be assessed as an »economic« strategy. However, there are practically no pig bones in the funerary complexes, which would seem logical when using the »economic« strategy, given their rather large percentage among the kitchen remains of the settlements. Moreover, the presence of pig bones among the others in the intramural sacral complexes indicates the selective approach in choosing a sacrifice for different purposes. Finds of »symbolic parts« of wild animals among amulets, even in the ordinary graves of women and children, underline their symbolic importance for the Crimean people, although hunting did not contribute much to their diet.

Horses and dogs obviously played a particularly important role in the ideology of the non-urban population of the Crimean foothills during all four chronological periods, and they had a particular role in the funerary rites. These animals are presented in many forms: as an animal »accompanying« the specific burial and as a post-funeral offering made by a group of people on special occasions. Their sacrifice was both symbolic and, in case of horses, costly signalling.

Volga-Don Region

First Period

Archaeological sites are represented by votive deposits in the western part of the region and barrow mounds in the eastern part (**fig. 1**). Animal bones are absent in hoards; they come from 15 elite barrow burials (60 %). In half of the cases, these are the bones of a ram (front leg with a shoulder blade; shoulder blade), as a rule together with a knife (Smirnov 1959, 243–244; Mordvintseva/Shinkar 1999, 138; Lyakhov/Mordvintseva 2000; Lukashov/Pryamukhin 2002, 208–209. 211; Mordvintseva/Khabarova 2006, cat. 60. 117–118. 127). In one female burial, the full skeletons of a sheep and two hares were found, as well as individual bones from at least three horses in a large bronze cauldron (Bespaly/Luk'ashko 2008, 97–101). Horse bones (front leg with shoulder blade; ribs and part of the spine) are found in two more burials (Rau 1927, 36–40; Mordvintseva/Khabarova 2006, cat. 122–123). Bovid bones (leg and ribs; ribs and vertebrae) come from three burial assemblages (Lyakhov/Mordvintseva 2000; Mordvintseva/Khabarova 2006, cat. 23–24, 217). An accumulation of boar bones was lying on the edge of the grave in Piterka, in addition to cattle and sheep bones found inside the grave (Lyakhov/Mordvintseva 2000). In three cases, animal bones have remained indetermined (Bulatov et al. 1975; Mordvintseva/Khabarova 2006, cat. 48. 61).

Second Period

The composition of archaeological sites has not changed, new barrow groups appear in the Lower Don sub-region (**fig. 2**). Animal bones come from 16 elite burial complexes (46 %). The hoards contained no animal bones. Horse bones (ribs and shoulder blade; ribs, sternum, foreleg; limbs; skull; indeterminate parts) were found in six burials (Rau 1927, 53–55; Shilov 1975, 141–145; Il'yukov/Vlaskin 1992, 80–82; Glebov 2002; Otchir-Goriaeva 2002), cattle bones (ribs and legs; pelvic bone) in three (Mordvintseva/Khabarova 2006, cat. 45. 68. 202), sheep bones (foreleg with shoulder blade; leg; carcass without head; ribs and leg bones; ribs, foreleg, vertebrae) in eight (Shilov 1975, 142–145; Il'yukov/Vlaskin 1992, 80–82; Zasetskaya et al. 1999, 59–60; Mordvintseva/Khabarova 2006, cat. 19–20. 63; Skvortsov/Skripkin 2008). In five burials, animal bones (mostly horse) lay either inside a cast bronze cauldron or next to a damaged one. Fish scales were found in one burial assemblage (Mordvintseva/Khabarova 2006, cat. 19–20). A piece of a deer antler lay among amulets in one female elite burial (Zasetskaya et al. 1999, 59–60). One burial contained the claws of an eagle (Shilov 1975, 144–145).

Third Period

Votive depositions disappeared in the western part of the region (**fig. 3**). Settlements with flat burial grounds appeared in the Don delta, close to the Bosporan city of Tanais. Animal bones are found in 21 elite burial assemblages (30 %). Horse bones lay in a cast bronze cauldron in one robbed male burial (Sergatskov 2000, 74–75). Bovine bones (no specification, three vertebrae in one case) accompanied four assemblages (Bespaly 1992; Mys'kov et al. 1999; Mordvintseva/Khabarova 2006, cat. 128–130. 132–133). Sheep bones are represented in 13 elite burials, mainly in form of a front leg (Sinitsyn 1946, 91–92; Sergatskov 2000, 74–75. 84–87; Dvornichenko et al. 2002; Mordvintseva/Khabarova 2006, cat. 215;). In two cases, the species remained indetermined. As a rule, animal bones lay together with a knife. One male burial contained fish bones (Il'yukov 1994, 200–201). In one case, bird bones were present (Sergatskov 2000, 71–72). A deer's tooth and tips of deer antlers lay in a pile of amulets (Bespaly 1986, 77–78; Dvornichenko et al. 2002).

Fourth Period

The spatial distribution of archaeological sites remained the same (**fig. 4**). Animal bones come from 15 elite burials (52 %). A custom of burying a horse or a bovine (complete or partial skeleton) on its stomach or on its side in the entrance pit of the burial chamber is noticed for the flat necropoleis in the Lower Don region (**fig. 5**; Larenok 2008a, 84–88. 209–210; 2008b, 131–133; Vereshchagin 2008, 21–24). In addition, the bones of a dog and the metapodia of a sheep were discovered (Larenok 2008b, 141–144). The bones of sheep/goat (tibia; ribs and vertebrae; hind leg; pelvis and leg) are mainly represented in the burial mounds (Dvornichenko/Fyodorov-Davydov 1989, 18–19. 41–44; Bespaly 1990; 2000; Mordvintseva/Khabarova 2006, cat. 64. 140–143). In one case, a horse skull was found (Bespaly 1990) and, in another case, the bones of a »cow« (Guguev/Bezuglov 1990).

Comparison

Since funerary sites are the only type of archaeological source in the region, at least for the first and second periods, only their comparison with standard burials is possible. Anatoliy Skripkin analysed a database of 594 burials dating from the 3rd to the 1st century BC in the course of a project on the statistical processing of burial sites in Asian Sarmatia (Skripkin 1997). As a result, he characterized »the meat-based food for the dead« as »an essential feature of the funeral rite«. Sheep, usually a leg, occupy the main place (39.4 % of burials in the Trans-Volga region/29.6 % of burials on the right bank of the Volga/32.1 % of burials in the Lower Don region/51.2 % of burials in Kalmykia). Bones of other species are rare: horse (1.4 %/2.3 %/2.1 %/4.6 %), cattle (0.6 %/0.8 %/4.3 %/0 %), and birds (0.2 %/0.8 %/2.1 %/0 %) (Skripkin 1997, 180. 184 tab. 22).

In the elite burials we are discussing here, the percentage of cattle and horse bones is much higher, totalling 50 %. About half of them were found inside a cast bronze cauldron or next to a broken one. This kind of object should be regarded as a prestige

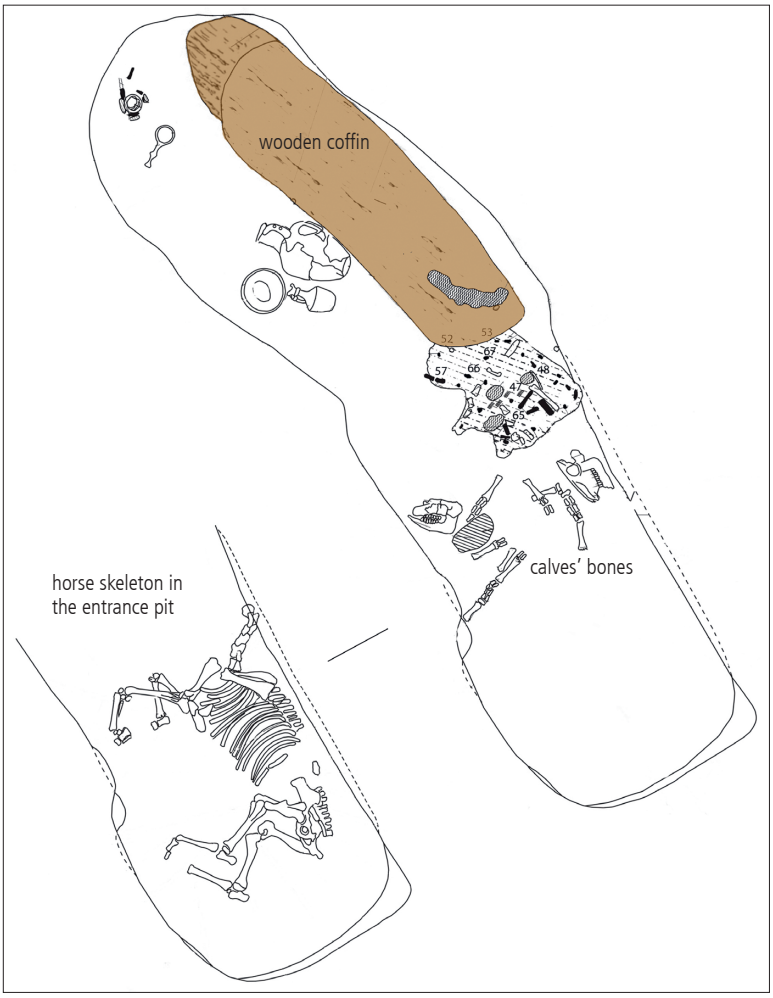

Fig. 5 Grave 7 of the Kobyakovo necropolis, dating to the first half of the 2nd century AD, with a horse skeleton lying in the entrance pit of the grave. – (After Vereshchagin 2008, fig. 59).

item directly associated with the elite status of the deceased (Mordvintseva 2023, 40–41). Thus, we can conclude that the »costly signalling« strategy of prestigious consumption was chosen for some distinguished representatives of the elite. Occasionally, a »symbolic« strategy was also used (wild boar bones). Finds of »symbolic parts of an animal« (fragments of deer antlers and teeth, the claws of an eagle) are apparently not associated with the sacrifice of these animals.

For the third period, Igor Sergatskov (2002) carried out a statistical analysis of 973 burials in Asian Sarmatia. He presented the results in a table that only provides a general percentage of unspecified bones: Trans-Volga with 8.12 %/Volga-Don interfluve, northern part, with 3.75 %/Volga-Don interfluve, southern part, with 10 %/Lower Don with 5.49 %/right bank of the Lower Volga with 8.06 %. The decoding of the statistical processing reveals that it concerns the bones of sheep, horse, and dog. According to Sergatskov, sheep (usually, a foreleg with a shoulder blade) predominate among sacrificial animals (Sergatskov 2002, 95–96). Thus, we might conclude that, in the case of sheep bones, an economic strategy was probably used (62 % of the elite burials). The cattle and horse bones originating from barrow burials in the steppe part of the Volga-Don region, especially those found in a bronze cauldron, should be regarded as the result of the »costly signalling« strategy. The »symbolic parts of animals« (teeth and pieces of deer antler) found chiefly in the female inventory are assumed to be amulets.

The published statistical analysis of 278 burial complexes belonging to the fourth chronological period also presents data in a highly generalized form (Moshkova 2009). According to the analysis, the number of burials containing animal bones (mostly sheep), is 23.92 % out of all the examined burial assemblages (Moshkova 2009, 95). Among the sheep bones, mostly legs with a shoulder blade or legs with pelvic bones were found. Horse leg bones, according to the statistical analysis, were recorded only in barrow mounds in the southern part of the Volga-Don interfluve, including the right bank of the Volga (Moshkova 2009, 96). The sacrifice of sheep was apparently carried out as part of an »economic« strategy. In the flat necropoleis of the Don-Delta, burials of horses, cattle (in the form of a »full animal« or a »partial animal«), and dogs are represented among the »adjacent« inventory. Their sacrifice may have been carried out following the »symbolic« and »costly signalling« models.

This partly corresponds to the data obtained from the cultural layers of the Lower Don settlements. The ratio of domestic animal species in the studied part of the archaeozoological complex of the Kobyakovo settlement: cattle (27.3 %), sheep/goat (27.3 %), horse (12 %), pi (11.5 %), donkey (2.1 %), and dog (15 %) (Kamenetskiy 2011, 257). The bones of wild animals accounted for 1.6 % of the total number of bones (Kamenetskiy 2011, 260). In the Podazovskoe settlement, the bones of domestic animals were distributed as follows: cattle (2626/55[13]), sheep/goat (2231/152), pig (362/28), horse (574/14), and dog (250/11). According to Igor Kamenetskiy, the condition of the horse and dog bones indicates their consumption (Kamenetskiy 1974, 214). The bones of wild animals accounted for about 1 % (Kamenetskiy 1974, 214). On the settlements of Khapry and Sukhoy Chaltyr, »cattle provided the bulk of the meat: 91 % in Khapry, and 44 % in Sukhoy Chaltyr«, with a small number of pigs in Sukhoy Chaltyr and their complete absence in Khapry (Kamenetskiy 2011, 257). A significant number of wild animals (40 %) was noted in the settlement of Sukhoy Chaltyr (Kamenetskiy 2011, 257). Comparing the data of the Don settlements with the graves in the same territory, one notes that pig bones are not represented in the burial complexes. This indicates selectivity in the choice of species for sacrifice at the funerals.

Kuban Region

First Period

Archaeological sites are represented by barrow mounds in the steppe and foothill zones and settlements and flat necropoleis along big rivers (**fig. 1**). Animal bones are represented in 22 elite complexes (42 %). Horse bones (in the form of a »full animal« lying on its side or on its belly in the grave or a separate pit, usually bridled, sometimes with grave goods; in two cases there was also a dog skeleton), cattle (complete skeletons and individual bones), sheep (head and legs), and in one case pig (humerus) come from elite graves in flat burial grounds and barrow mounds located along the Kuban and on its left bank (Mordvintseva/Treister 2007, cat. A377. A379; Mord-

13 The first number indicates the number of bones examined (NISP), the second one indicates the minimum number of individuals (MNI).

vintseva et al. 2010, cat. 250. 215–217. 362–391. 497; Beglova/Erlikh 2018, 13–14. 20–22. 52–64. 74–77. 81–84. 111–112). Sheep bones (indeterminate bones; scapula, ribs, pelvis with a leg; head and legs) and, rarely, horse bones as a »part of animal« were found in barrow burials on the right bank of the Kuban (Marchenko 1996, 191 complex 142. 293 complex 288; Mordvintseva et al. 2010, cat. 110. 218. 551–552). A wild boar skull, in addition to the full skeletons of horses and a cow, accompanied an ostentatious male burial in the foothills of the North Caucasus (Mordvintseva et al. 2012). In the sanctuary-mound of the Tenginskaya burial ground, the tusks of a wild boar and a deer antler were found (Beglova/Erlikh 2018, 52–64). Unidentified animal bones were noted in seven burials. In the barrows on the Kuban's right bank, in most cases, a knife was found along with the animal bones.

Second Period

The number of settlements along the Kuban increases, new clusters of settlements appear along the Kirpili River on the Kuban's right bank (**fig. 2**). Animal bones come from nine elite burials (17 %). A bridled horse skeleton was found in the Severskiy Barrow (Smirnov 1953). Horse teeth were placed together with grave goods in the barrow mound (a ritual deposit?) on the Kuban's left bank (Mordvintseva et al. 2010, cat. 205–212). Sheep bones accompanied five elite barrow burials on the Kuban's right bank (Chernopitskiy 1985; Savchenko 1994, 92–94; Mordvintseva et al. 2010, cat. 147. 433–434. 465–479). A deer antler lay behind the head of a buried man in a barrow grave in the foothills of the North Caucasus (Gushchina/Zasetskaya 1989, 91–92. 123–124). In one case, the animal species was not identified.

Third Period

Barrow graves ceased on the steppe of the Kuban's right bank (**fig. 3**). Animal bones are represented in seven elite burials (11 %). A horse's tooth comes from a barrow burial in the foothills of the North Caucasus (Gushchina/Zasetskaya 1989, 92–96. 123–124). Six barrows in the so-called »Golden Cemetery« in the middle reaches of the Kuban contained wild boar tusks and a fragment of a deer antler (Gushchina/Zasetskaya 1994, 61. 70–71. 74–75). The absence of animal bones in the elite burials of this period may be due to the unsatisfactory documentation of the burials' composition during the early 20th-century excavations.

Fourth Period

The number of archaeological sites becomes smaller, and they are concentrated mainly along the Kuban (**fig. 4**). Animal bones come from 15 elite burials (47 %). In the flat burials on the Kuban's left bank, horse skeletons (from one to three individuals) were found – lying on their sides, in the entrance pit of the grave or in a separate pit, bridled, sometimes with grave goods (Sazonov 1992; Mordvinceva/Treister 2007, cat. A62–A66; Mordvintseva et al. 2010, cat. 269. 270–272. 273. 274–275. 521–527. 605–606). In some cases, complete skeletons or individual bones of cattle accompanied them (Mordvintseva et al. 2010, cat. 267–268. 269. 273. 539). In some barrows in the »Golden Cemetery« on the Kuban's right bank, complete skeletons of horses, including bridled ones, sheep bones and a wild boar tusk were found (Mordvintseva et al. 2010, cat. 532–534. 542).

Comparison

Despite the great number of settlements in which animal bones make up the bulk of finds, there is very little information on them (Kamenetskiy 2011, 254). In the lower reaches of the Kuban, in the Semibratnee settlement, domestic animals predominate (95.1 %). The ratios of animal species in the period from the 3rd to the 1st century BC are as follows: cattle (88/9), sheep/goat (31/9), pig (27/11), horse (43/5), dogs (19/6), deer (19/3), and wild boar (3/2). In the period from the 1st to the 3rd century AD, the ratios are: cattle (84/11), sheep/goat (25/9), pig (27/10), horse (17/2), dog (2/2), deer (15/3), and wild boar (7/2) (Tsalkin 1960, 103 tab. 13).

Materials from barrow mounds and flat necropoleis show significant differences in the species composition of sacrificial animals and the forms of their representation. In the barrows on the Kuban's right bank, there is a complete predominance of sheep bones (96 %), mostly the front leg and shoulder blade (64 %) (Marchenko 1996, 106). In the flat necropoleis, the picture is more complicated.

In the ordinary flat graves of the first period, located along the Kuban, a »whole animal« (12 %) or »parts of an animal«, that is, head, legs (78 %) and limbs with ribs (10 %), are represented (Marchenko 1996, 97). Animal species were identified for 95 burials: pig (59 %), horse or cattle (21 %), and sheep (12 %) (Marchenko 1996, 98). The knife, as a rule, was absent. Interestingly, pig bones are presented singly in the elite burials, which is evidence of the »costly signalling« strategy for a sacrifice at an elite funeral.

»Full animals« (mainly horses) were also buried outside the human burials, in separate pits, randomly across the necropolis. Thus, a group of six horses (stallions) and a dog was studied in flat grave 2-1945 in Ladozhskaya (Berlizov/Anfimov 2005, 114–115). The bodies of horses were placed on their sides or stomachs with bent legs, and the authors of the publication suggest that the animals were tied to a post. All the horses had bridles but were not wearing them, and iron bits had been laid under the lower jaw of each animal. Their skulls have traces of lethal blows. Two horse skeletons were covered with the chopped bones of another horse, a bovine, and a ram. Beside each horse, three roe deer antlers were found, still attached to a part of the skull. In grave 3-1945 in the same cemetery, next to the burial of a man accompanied by just two hand-formed pots, there were two horse skeletons with an oblong hole in the centre of each skull's frontal bone, indicating lethal violence, with iron bits under the lower jaw. Above the horses, there was a dog skeleton lying on its side.

From the 1st century BC, a new tendency is noticed in the flat necropoleis. In the eastern group of sites, in 20 % of the burials dating to the second and third periods, the »sacrificial food« is represented by the front leg and shoulder blade of a sheep. In the western group, such burials constitute 43 %. At the same time, the pattern »knife with sacrificial food« also appears in the flat burials (Marchenko 1996, 107), thus resembling the pattern noticed for the Volga-Don region.

Thus, in the first period, the sacrifices performed by the nomadic population of the Kuban's right bank steppe (mostly sheep) and by the agricultural population of the settlements along the Kuban and on its left bank (horse, cattle, rarely sheep/goat, pig) differ significantly. The sacrifice of a sheep in the barrow burial grounds and a pig in the flat necropoleis was probably carried out as part of an »economic« strategy. The complex manipulations during the sacrifice of horses testify to their ideological significance in the carrying out of funerary rituals and the application of both the »costly signalling« and »symbolic« strategies.

In the 1st century BC, the funerary rites of the population who settled along the Kuban and on the Kuban's left bank changed; the custom of placing a sheep's leg in the grave appeared and the practice of burying horses in separate pits ceased. This probably testifies to the adaptation of some nomadic customs by the settled population under the direct ideological influence of foreign groups in a zone of intense contact (Ulf 2009, 87. 95–97). The sacrifice of a horse in the Severskiy Barrow, situated separately from other elite burial structures and close to the Asian part of the Bosporan kingdom, looks more like an exception. The next radical change took place in the second half of the 2nd century AD, when horse sacrifices were carried out in both flat necropoleis and barrow burial grounds, apparently within the »costly signalling« and »symbolic« strategy.

Symbolic parts of wild animals (deer and wild boar) were found mainly in the funerary assemblages of the Kuban's left bank and in the foothills of the North Caucasus. In many cases, they marked male elite burials, which indicates the great symbolic role of hunting in emphasizing an elite status.

Discussion

Domestic animals were absolutely predominant among the species found in the elite burial assemblages of the northern Black Sea region: sheep/goat, cattle, horse, and dog. Wild animals (boar, deer, in single cases birds of prey and bear) are represented mainly by »symbolic parts« (tusks, claws, antlers) as amulets. In single cases, wild boar bones are found, once in the forest-steppe, once in the North Caucasus mountain zone.

The remains of sacrifices represent several patterns: 1) the absence of animal bones in burial assemblages; 2) »sheep/goat leg + knife«; 3) »horse/cattle bones + cast bronze cauldron«; 4) »cattle leg + plate«; 5) horse/cattle and dog as a »full animal«, a »partial animal« or »stuffed animal«. Their distribution has chronological and spatial peculiarities.

The absence of animal bones in the presence of horse harnesses among the grave goods was noticed for the Lower Dnieper and the western part of the Volga-Don region in the first and second chronological periods. These complexes contain ritual deposits (hoards), which differ significantly from the elite burials of the neighbouring population groups. In itself, the absence of sacrificial animal bones in a burial assemblage does not necessarily mean a complete rejection of funerary sacrificial rituals. The obligatory presence of harness items in the hoards may have been symbolic markers of a sacrifical victim, the remains of which are not presented *in situ*. This pattern completely disappears in the 1st century AD.

Another version of »absence of animal bones in graves« is noted for the Crimean south coast (third and fourth periods). The sacral sites of this area show the sacrificing of cranial parts of pig and sheep/goat.

The pattern »sheep leg + knife« was noted mainly for barrow burials (standard and elite) of all chronological periods in the steppe part of the Volga-Don

interfluve, as well as for barrows of the first and second periods on the Kuban's right bank steppe. It is also recorded in some flat burials in northwestern Crimea in the first period and those in the Kuban region in the second and third periods. The choice of a sacrificial animal could be determined by economic factors (sheep were the most accessible species in nomadic or semi-nomadic societies), but the influence of an ideological factor cannot be ruled out.

The pattern »horse/cattle bones + cast bronze cauldron« is recorded in the elite burials of the Volga-Don region from the first to the third chronological periods, but much less frequently than the pattern »sheep leg + knife«. The choice of the victim was obviously carried out within the »costly signalling« and »symbolic« strategies. It is worthwhile to compare this pattern with the Scythian sacrificial custom described by Herodotus in his *Histories* (IV.61)[14]: »[…] having flayed the victims, they strip the flesh off the bones and then put it into caldrons […] into these they put the flesh and boil it by lighting under it the bones of the victim […]. And they sacrifice various kinds of cattle, but especially horses«.

The pattern »cattle leg + plate« is most typical for the elite burials in the flat necropoleis of the Crimean foothills (from the second to the fourth chronological period) and the Kuban region (in the first and second periods). This can be regarded as an »economic« model, since cattle represented the main source of nutrition in these settled territories.

Complex rituals in which cattle, horses and dogs were sacrificed were performed in the flat necropoleis of the Crimean foothills (all periods), the Kuban region (first, second, and fourth periods), the Lower Dnieper (third period), and the Don delta (fourth period), i. e. in areas inhabited by the settled population. In the Crimean foothills, the Kuban region, and the Lower Dnieper, burials of horses, dogs and cattle were mainly carried out in separate pits in flat necropoleis, while in the Don delta complete and partial animals were buried in the entrance pits of the catacombs. The choice of the species was obviously governed by its symbolic and/or prestige value.

While the sacrifices dealing with a »part of the animal« shared the victim between the sacred and profane worlds, a »full animal« sacrificed belongs completely to the sacred world. The making of a »stuffed animal« resembles agrarian rituals of the revival of the victim. Such a ritual is described for Prytaneum: »The meat of the bull was divided among those present, and the skin was sewn together, stuffed with straw, and the animal stuffed with straw was harnessed to the plow« (Mauss 2000, 81).

Burials of horses (»full animals« as well as »partial animals«) are also well known in the Bosporan necropoleis (Maslennikov 1981, 78–79; Korpusova 1983, 30; Khrshanovskiy 2000, 248). The ritual burials of dogs (including those combined with a horse burial) are found in almost all Bosporan cities, but they are largely characteristic of the European Bosporus (Moleva 1998, 61; Khrshanovskiy 2000, 243. 247). This burial custom can be traced back to the 5th-century BC Bosporan religious practice (Nymphaeum), but it was practiced most widely in Hellenistic times and in the first centuries AD. Judging by the fact that only horses and dogs were honoured with separate burials in the Bosporan necropoleis, Vladimir Khrashanovskiy assumed that in funerary and memorial rites they had a special status of transitory mediators from one world to another. It is remarkable that the barbarian societies practicing the sacrifices of horses and dogs are mostly adjacent to the Bosporan cities.

Thus, the choice of the victim and the form of its representation were largely determined by the cultural ecology, and the observed patterns should mark the cultural and economic affiliation of the population and its ideological (and political?) orientation.

In the following we will consider the images of animals found in barbarian elite burial contexts in the northern Black Sea region, and compare the results with the analysis of sacrificial remains. Let us try to answer the question of whether the choice of a sacrificial animal and animal images placed on the grave goods were somehow connected.

Images of Animals and Their Connection to the Sacrificed Animals

The close connection between the »Sarmatians« and the »Animal Style« has been recognized by many researchers (Rostovtzeff 1922, 23–25. 105; 1929, 28. 42–44; Smirnov 1976, 80; Zasetskaya 1980, 54; 1989, 41–42. 44). However, there are no uniformly accepted classification criteria of this art. The most popular definition of the »Animal Style of the Eurasian nomads« is »depicting certain animals in a certain way« (Tchlenova 1962, 3). The analysis of »Polychrome Animal Style« objects from the northern

14 https://lexundria.com/hdt/4.61/mcly (Herodotus, transl. G. C. Macaulay; accessed 16.8.2025).

Black Sea region has demonstrated the presence of several stylistic groups, probably associated with different handicraft traditions (Mordvintseva 2003; Mordvinceva/Treister 2007). A comparison of animal images with real species, carried out by a professional zoologist, revealed the fact that it is sometimes impossible to determine the genus and even the order (Serdyuk 2003, 96), because many of the images do not bear enough recognizable features that would allow us to identify the animal species.

For the analysis, I include images of those animals, the remains of which, in one form or another, were found in the elite burials: horse, sheep, ram, bovid, wild boar, deer, dog, pig, fish, turtle, hare, and bird (»potential victims«[15] of sacrificial acts). In particular, I will focus on the purpose of the objects with images (utilitarian vs. extra-utilitarian or ritual) and their origin (imports or locally produced items).

Lower Dnieper

First and Second Periods

Images of animals (**figs 6-7**) were found in eight elite complexes (40 %) on utilitarian items (horse harness phalerae; costume details: belt plates, brooches, earrings, fingerrings, bracelets). Forty-five per cent of the zoomorphic characters are »potential victims«, the rest represent lions, fantastic animals and snakes. On one silver phalera from the Starobelsk Hoard two pairs of animals turned towards each other are depicted: a lioness facing a bull, and a lion facing a boar (Mordvinceva 2001, cat. 51). Similar scenes adorn the phalera from Tvarditsa: a lion facing a lioness, and a lion-griffin facing a deer (Mordvinceva 2001, cat. 79–80). Motifs of a standing deer with its head turned back are represented on horse bronze cheek-plates from Bubuech (Mordvintseva 2000). On the brooch from Sokolovo (Mordvinceva/Treister 2007, cat. A370), there is a horse as part of the »rider« motif. An iron belt plate covered with gold foil from the Veselaya Dolina ritual deposit depicts a bird pecking at a fish (a symbol of Olbia[16]) and a dog (cf. **fig. 10, 1**; Mordvinceva/Redina 2013).

Most of these items were made in the North Pontic region (Mordvinceva 2001, 36–37; Mordvinceva/Redina 2013). Stylistic features of the horse cheek-plates from Bubuech have parallels in the Central European artistic tradition (Mordvintseva 2000). Objects decorated in a similar way originate from chronologically close complexes in the Lower Dnieper and Crimea, which probably suggests a local production.

Third Period

Animal images (**fig. 8**) come from ten elite complexes (24 %); they are represented mainly on utilitarian objects (costume decorations: bracelets, torques, belt details, sew-on plaques, fingerrings, earrings; as decorative details on weapons and harnesses; vessels: cast bronze cauldrons, a silver goblet, a wooden vessel) and less on extra-utilitarian ones (figurines). Sixty per cent of zoomorphic images represent »potential victims«, the rest are predators and fantastic animals.

The majority of the depictions are ungulates. The handle of a silver goblet from Porogi is formed as a horse (Mordvinceva/Treister 2007, cat. A234.1). Bracelets and a torque with ends in the form of an ungulate's head represent a series of stylistically similar images (Mordvinceva/Treister 2007, cat. A84. A234. B37; see **fig. 15, 7. 9**). Earrings and the handles of a bronze cast cauldron are formed into a goat shape (Mordvinceva/Treister 2007, cat. A61. B10). In Zaporozhskiy Barrow, belt plates depicting a bull being tormented by fantastic creatures and horse phalerae with the image of a swastika-coiled goat were found (Mordvinceva/Treister 2007, cat. A84; see **fig. 15, 1. 4**). The bronze cauldron from Kalmius (**fig. 10, 3**) has a spout in the form of a bull's head, a deer-shaped handle and the motif of »a bird pecking a fish« (Mordvinceva 2013). One figurine and a plaque are decorated with the depiction of a bird (Mordvinceva/Treister 2007, cat. B46; Simonenko 2008, 71 cat. 92).

Some of the utilitarian items are imported samples of the Polychrome Animal Style (»Tillya-tepe group«; Mordvintseva 2003, 210 fig. 95). The motif of a swastika-shaped goat, and P-shaped plates with a torment scene are local derivatives of the »Central Asian group« (Mordvintseva 2003, 211 fig. 96). According to the manufacturing technique and stylistic features, earrings in the shape of a goat belong to the Kuban artistic and production tradition (Mordvintseva et al. 2010, 13). Bronze cauldrons deserve special attention; they can be associated with the performance of funerary rituals, in particular, sacrifices. Cast cauldrons with goat-shaped handles belong to a series of items known from the burials of the nomadic elite of the Volga-Don and the Kuban regions (see below). The cauldron from Kalmius

15 A conditional term that I will apply to images of those animals whose parts or complete skeletons were found in the elite burials.

16 The motif of an »eagle on a dolphin (fish)« was very popular in the northern Black Sea region. In particular, it was depicted on the coins of Olbia (Anokhin 1989, 23-24).

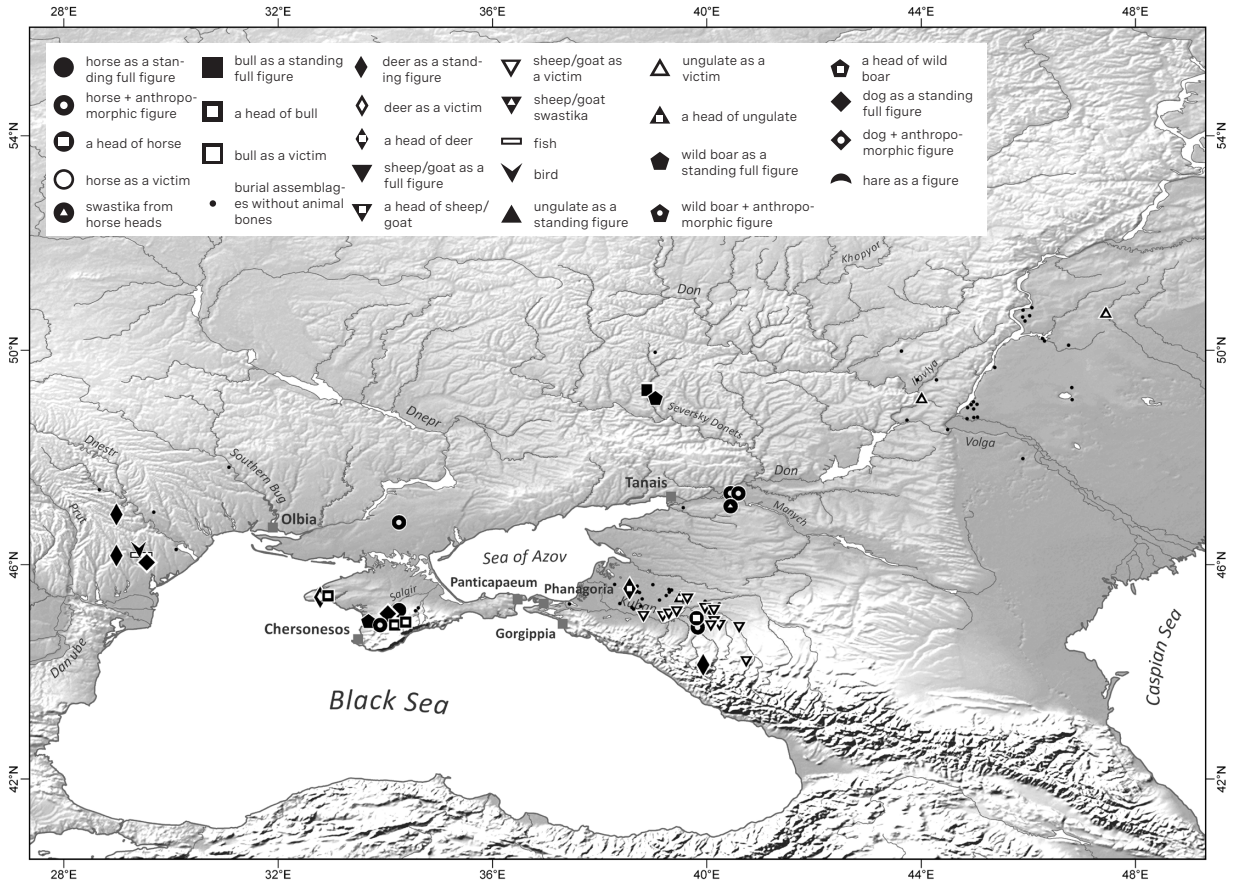

Fig. 6 Representations of »potential victims« from the elite burial contexts of the North Pontic region, 3rd to 2nd century BC. – (Map V. Mordvintseva).

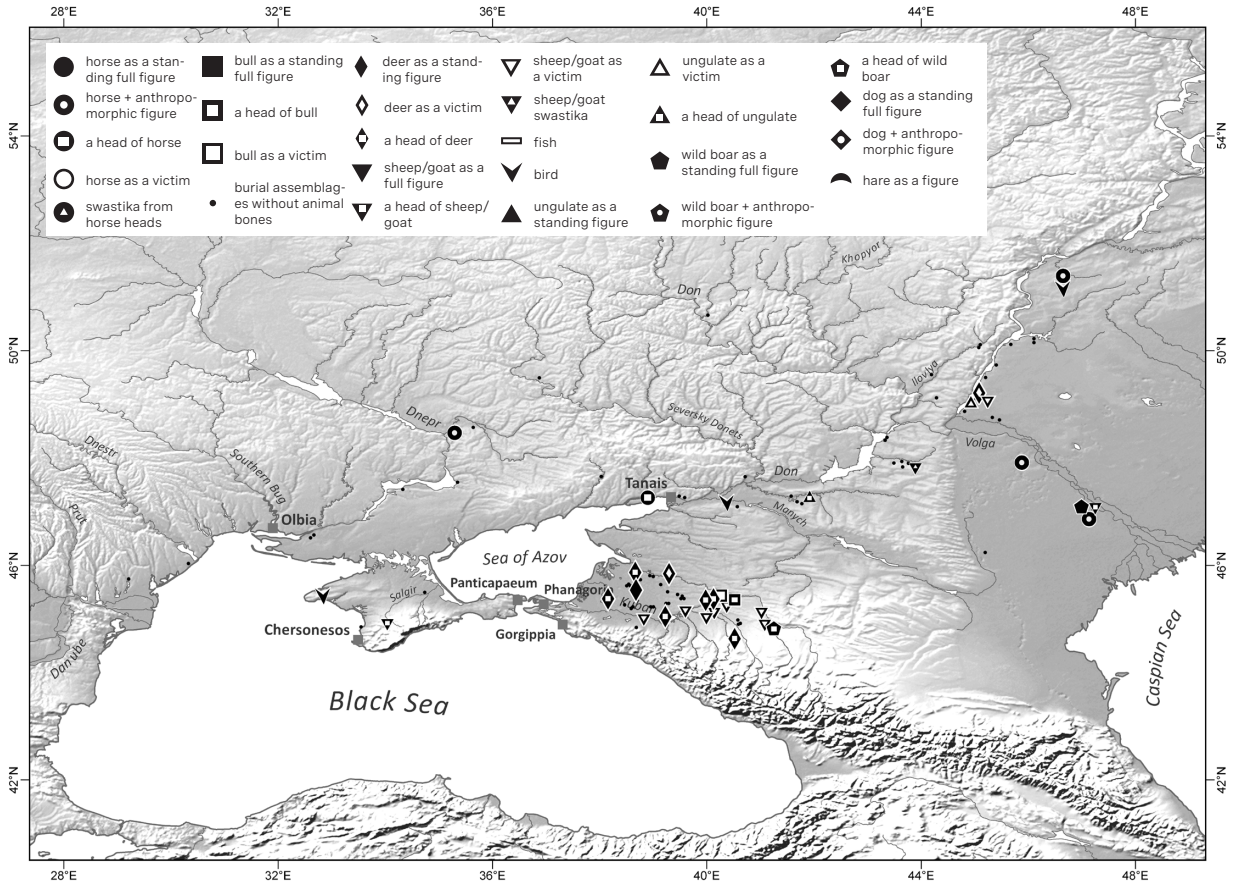

Fig. 7 Representations of »potential victims« from the elite burial contexts of the North Pontic region, 1st century BC. – (Map V. Mordvintseva).

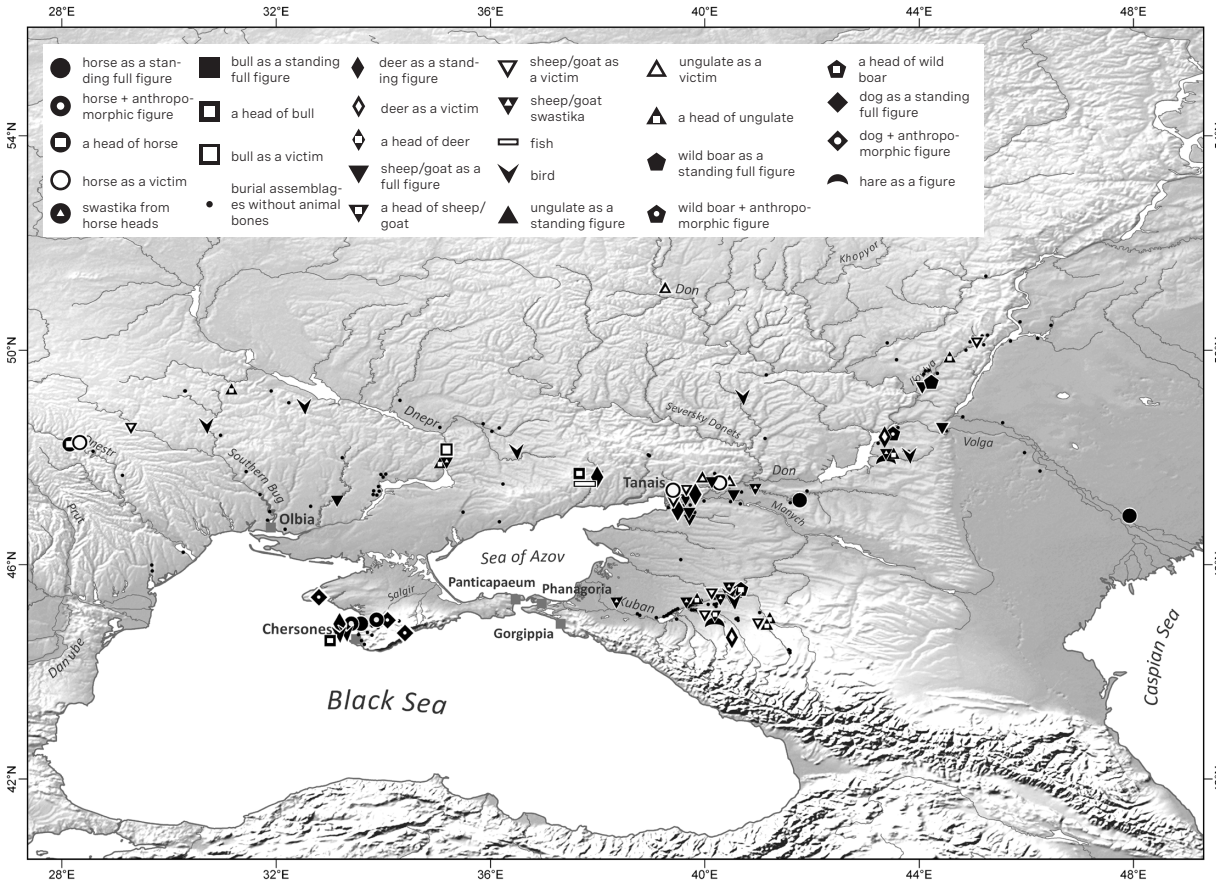

Fig. 8 Representations of »potential victims« from the elite burial contexts of the North Pontic region, 1st to mid-2nd century AD. – (Map V. Mordvintseva).

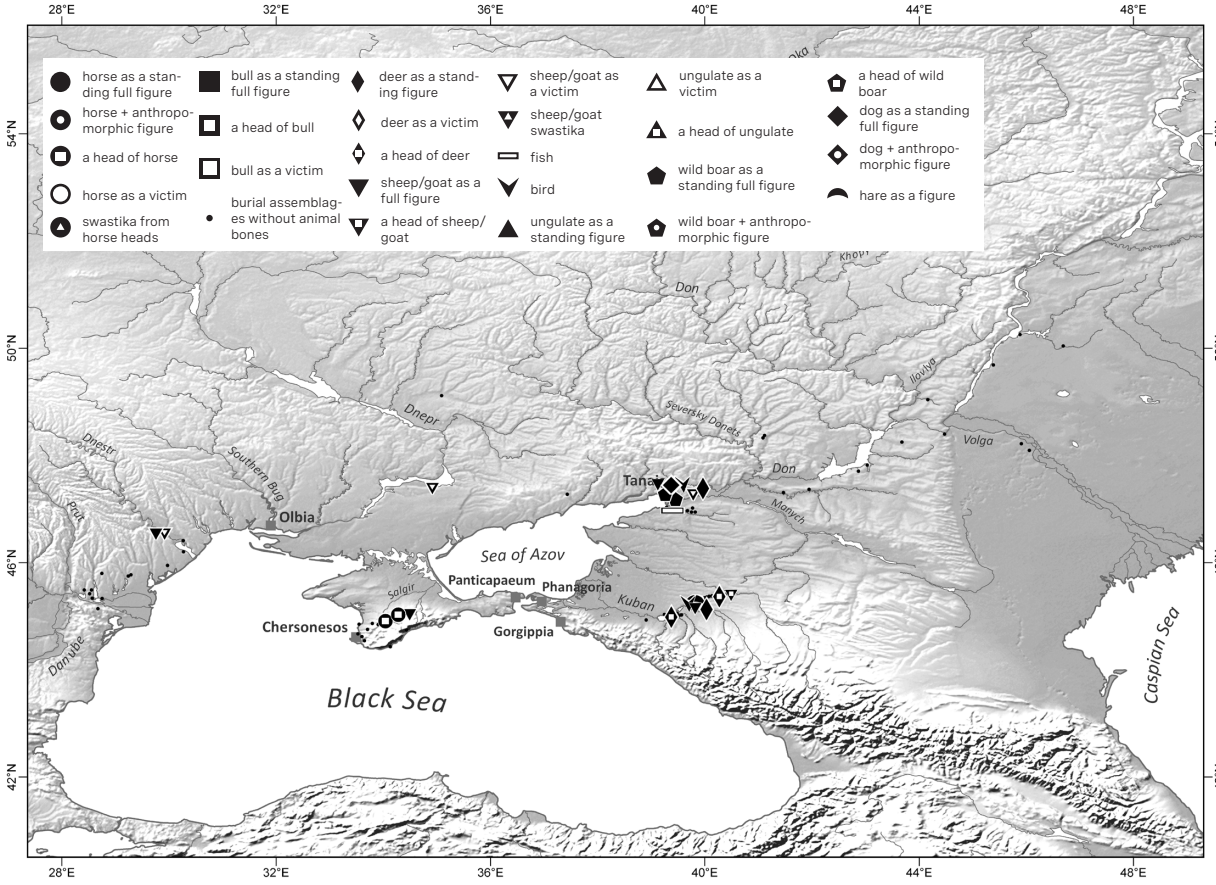

Fig. 9 Representations of »potential victims« from the elite burial contexts of the North Pontic region, mid-2nd to mid-3rd century AD. – (Map V. Mordvintseva).

(**fig. 10, 3**) is particularly complex in design and execution, combining symbols that are more characteristic of the settled rather than the nomadic cultural environment (e. g. the scene of making a ceramic vessel, or the Olbian symbol of a »bird pecking a fish«) (Mordvintseva 2013).

Fourth Period

Images of animals (**fig. 9**) were found in four elite complexes (18 %), on utilitarian objects (a bowl, a whetstone, red-slip vessels) and extra-utilitarian ones (a wooden figurine of an indeterminate animal overlaid with gold) (Simonenko 2008, 82 cat. 138). Seventy-five per cent of the characters show a »potential victim«; the handle of a wooden vessel is carved in the form of a predator. A whetstone with the incised image of a goat (Kurchatov/Bubulich 2003, fig. 4, 7) is apparently of local manufacture. Two imported red-slip vessels are ram-shaped (Simonenko 2008, cat. 138. 161). Such vessels are also known in the elite burials of other parts of the North Pontic region (see below), which indicates the selectivity in the choice of this particular vessel form and, accordingly, the special symbolic significance of the ram.

Crimea

First Period

Animal images (**fig. 6**) were found in ten elite burials (49 %), mostly on utilitarian items (mirrors; costume decorations: bracelets, earrings, pendants, belt details) and extra-utilitarian ones (altars, plaques). Fifty-seven per cent of the depicted characters are lions, fantastic monsters and snakes, 43 % are »potential victims« (horse, bull, dog, wild boar). In the Mausoleum in Neapolis Scythica, belt buckles in the form of highly stylized figurines were found, which are presumed to represent a dog (**fig. 11, 1**) and a horse (**fig. 11, 2**). The ceramic altar in the Mausoleum's main burial shows garlands and bucrania (Zaytsev 2004, fig. 121). The handle of a mirror from the Eastern necropolis is decorated with a bull's head (Zaytsev 2004, fig. 124, 4). A bronze plaque depicting a lying deer (Dashevskaya 2014, 15–16 tab. 14, 2) and a pendant in the form of a bull's head (Dashevskaya 2014, tab. 29, 7) were placed as amulets in children's burials in the Belyaus flat necropolis. In Chisten'koe Barrow (Zaytsev/Koltukhov 2004) horse cheek-plates depicting a human figure, masks and a wild boar, stylistically similar to those found in the Bubuech Hoard (see above), as well as a belt plate depicting a »master of animals« – a man's figure surrounded by winged horses –, were found (**fig. 10, 2**). All items are locally made. They imitate images of Greek (altar) and Central European (belt details, mirror, harness decorations) origin (Mordvintseva 2020).

Second Period

Images of animals (**fig. 7**) were found in six elite burial complexes (20 %), including utilitarian (costume items: neck-rings, bracelets, earrings, brooches; vessels) and extra-utilitarian (finials; amulets) items. »Potential victims« make up 21 % of the images; most of the characters are predators (lions), fantastic animals, and snakes. Rams' heads adorn the bronze finial from Neapolis Scythica (Pogrebova 1961, 205), whereas a bird of prey is found on another one from Belyaus (Dashevskaya 2014, 24–25). Both finials are likely to be imports.

Third Period

Images of animals (**fig 8**) were found in ten elite burial complexes (21 %), both on utilitarian (bracelets, ceramic lamp, brooches) and extra-utilitarian (painted on a wooden coffin; wooden ritual vessels; pendants and figurines) objects. »Potential victims« make up 62 %, the rest are represented by predators, snakes, and dolphins.

One image comes from the Crimean south coast: a brooch depicting Artemis at the altar accompanied by a dog (Mordvintseva et al. 2016). Most of the images were found in elite burials in the Ust'-Al'ma burial ground in southwest Crimea (Zaytsev 2000; Loboda et al. 2002; Zaytsev/Mordvintseva 2002; Puzdrovskij/Zajcev 2004; Puzdrovskiy 2007). The silver figurines of an eagle and a deer were originally bound together with a silver chain (**fig. 12, 3**). Wooden items are of particular interest because they could be made specifically for funerals. A large spouted wooden cauldron from catacomb 595 (containing a bridled horse »doll«, see above) was decorated with several animal figurines. Most of these were deliberately cut off before burial, except for the horse-shaped figure. Above this figurine, there was an amphora-shaped item, movably fixed in a groove. The horse's ears were also cut off (**fig. 12, 4**). Grave 700 yielded several wooden vessels: one is basin-shaped with four animal figurines and the other a cup with a bird of prey sitting on its edge (**fig. 12, 2**). A wooden coffin from catacomb 550 was painted with an image of a rider flanked by creatures apparently belonging to the Underworld, one of which is holding out an object (rhyton?) to the rider (**fig. 12, 1**).

In addition to the images found directly in the elite burials, funerary steles with images of a horseman in combination with a dog (**fig. 11, 4-7**) are known from necropoleis in the Crimean foothills (Neapolis Scythica, Belyaus, Bakhchisaray). They were made as replicas and derivatives of the Bosporan or Roman funerary monuments (**fig. 11, 3**) and have been broadly dated to the first centuries AD (Voloshinov 2004).

Fourth Period

Images of horse heads represented on horse forehead decorations (**fig. 9**) come from two elite burials (12 %; Khrapunov 2007; Zaytsev/Mordvintseva 2007). A funerary relief depicting a rider (**fig. 11, 6**) apparently belongs to the beginning of the period; in the 19th century, it was interpreted as the image of a Scythian king, Palakus (late 2nd century BC; Voloshinov 2004; Zaytsev/Mordvintseva 2007). At the Neyzats necropolis, ritual pit 2 was discovered, filled with hand-formed pots, including ram-shaped ones (**fig. 12, 5;** Khrapunov 2013b, 350), which are obviously derivatives of red-slip vessels representing the same animal, but standing – not lying down. This find testifies to the special symbolic meaning of these animals.

Volga-Don Region

First Period

Images of animals were found in seven elite complexes (28 %) on utilitarian (harness decorations; a quiver hook; sew-on plaques; belt details) and extra-utilitarian (ritual plates) objects (**fig. 6**). »Potential victims« make up 33 % of the images, the rest of the characters are represented by predators and fantastic animals. Horses are depicted several times on the phalerae of the Fedulov Hoard in the western part of the region, in the form of a zoomorphic swastika and as secondary characters in the »rider« and »Helios in quadriga« motifs (Mordvinceva 2001, tab. 2, 3–4; 3, 6). A quiver hook from the Kachalinskaya Hoard has the shape of an ungulate being tormented by a predator (Sergatskov 2009). An ungulate (horse?) is depicted on a ritual plate from Piterka (Lyakhov/ Mordvintseva 2000). The phalerae could have been made in a Bosporan workshop (Mordvintseva 2001, 36–37). A local item, possibly made especially for the burial, is a wooden ritual plate with carved images and covered with gold foil. Such objects are known only in the highest elite burials of the Volga-Don region – one in the Kuban region (Mordvintseva/Khabarova 2006, 39–42), but, as a rule, fantastic animals and predators were depicted on them.

Second Period

Images of animals were found in fifteen elite burials (43 %) on utilitarian (phalerae; table vessels; a whetstone; costume items: plaques, buckles, neck-rings, bracelets, earrings) and extra-utilitarian (ritual plates) objects (**fig. 7**). Among the characters, the proportion of »potential victims« increased (63 %). The head of an ungulate is used as a motif on a buckle from Novyi (Il'yukov/Vlaskin 1992, 42–45 fig. 7 complex 22), and on a pectoral (ram) from Kosika (Mordvinceva/Treister 2007, cat. A114). The bracelets from Kalinovka have ends that are shaped into lying ungulate figures (Mordvinceva/Treister 2007, cat. A101). An ungulate (ram) is depicted on the phalerae from Zhutovo (Mordvinceva 2001, cat. 39), on the buckle (goat; see **fig. 15, 2**) and in the torment scene on the end of the bracelet (deer) from Vernepogromnoe (Mordvinceva/Treister 2007, cat. A32) as well as in the torment scenes on the pectoral from Kosika (deer). A silver vessel from Kosika depicts fighting horsemen, and it has handles in shape of a wild boar (**fig. 14, 1-2**; Mordvinceva/Treister 2007, cat. A114). Horsemen as single figures are represented on the silver phalerae from Krivaya Luka (Mordvinceva 2001, tab. 19 cat. 38). Sew-on plaques are made in the form of birds (Mordvinceva/Treister 2007, cat. A3; Skvortsov/Skripkin 2008). In Mayerovskiy Barrow, the mirror's handle depicts an anthropomorphic figure between two horses (Skvortsov/Skripkin 2008). The forehead phalera from the Taganrog Hoard depicts a horse protome (Mordvinceva 2001, cat. 47).

The closest parallels to the image on the phalera from Taganrog are represented on the coins of Tyras (Karyshkovskiy/Kleyman 1985, fig. 21, 7–8). This item was probably made in the North Pontic region under the influence of Greek pictorial tradition (Mordvinceva 2001, 37). The silver vessel with boar-handles and a fighting scene from Kosika was apparently produced in Transcaucasia (Treister 1994). The mirror from Mayerovskiy probably originates from the Kuban local workshops that also made most of the jewellery items found in the grave. Other images are originals, replicas and derivatives of items of the Iranian cultural circle, to which the term »Animal Style« is usually applied (Mordvintseva 2003).

Third Period

Images of animals were found in 30 elite burials (43 %) on utilitarian (phalerae; a sword; tableware;

flasks; bronze cast cauldrons; costume items: diadems, bracelets, neck-rings, necklaces, belt details, sew-on plaques) and extra-utilitarian (ritual plates; amulet rings) items (**fig. 8**). Fifty-five per cent of the images represent a »potential victim«, the rest of the characters are mostly fantastic animals and predators.

There are images of a goat on sew-on plaques (Mordvinceva/Treister 2007, cat. B45. A109), cast cauldrons (handles; see Raev 1986; Sergatskov 2000, 77–80; Mordvinceva/Treister 2007, cat. A81; Bespaly/Luk'yashko 2008, 61–63), phalerae (**fig. 15, 3. 5**; Mordvinceva 2001, cat. 93; Mordvinceva/Treister 2007, cat. A106), a bracelet (Mordvinceva/Treister 2007, cat. A280), and a ritual plate (Sergatskov 2000, 24–26). Ungulates with antlers (deer? elk?) are represented by a goblet handle, on plaques and a diadem, as well as on a pyxis and a flask-pendant (being tormented by fantastic predators, see **fig. 15, 6**) from the Khokhlach Barrow (Mordvinceva/Treister 2007, cat. B45), on a bracelet from the Dachi Barrow (Mordvinceva/Treister 2007, cat. A67), and a belt plate from Mekhzavod (Mordvinceva/Treister 2007, cat. A128). The heads of unidentified ungulates adorn the ends of a neck-ring (**fig. 15, 8**) and bracelets (Berkhin 1959, 37–41; Mordvintseva 2003, cat. 82 fig. 34; Mordvinceva/Treister 2007, cat. A160). The handle of a goblet from Krivolimanskiy (Mordvinceva/Treister 2007, cat. A116) is made in the form of a horse figurine. A red-slip vessel in the shape of a ram was found in Kobyakovo barrow 10 (Mordvinceva/Treister 2007, cat. A109). The handles of cast bronze cauldrons are in the shape of a wild boar (Sergatskov 2000, 67–71) and a horse (Dvornichenko et al. 2002). The vessel from Verbovskiy is similar to that found in the Kosika burial of the previous period; it depicts scenes of the hunting of a wild boar and the tormenting of a deer (**fig. 14, 3-4**) (Mordvinceva/Treister 2007, cat. A31). Figurines of birds and a hare adorn precious goblets (Mordvinceva/Treister 2007, cat. A72. A163).

Bronze cast cauldrons, which were probably associated with sacrifices, have been decorated with zoomorphic handles only in the given chronological period, and vessels of this type, as a rule, also have a drain spout, which may indicate complex manipulations that were performed using them. The rest of the items belong to the range of »Animal Style« products, both imported and made in the northern Black Sea region (see Mordvintseva 2003).

Fourth Period

Images of animals were found in four elite burials (14 %) on utilitarian (wooden vessels; harness ornaments; cast bronze cauldrons) and extra-utilitarian (amulets) objects (**fig. 9**). Images of a »potential victim« make up 82 %; in isolated cases, a fantastic animal and a predator are represented. Figures of dogs, birds, and a ram are set on the rings/amulets from Valovyi (Bezuglov et al. 2009, 24–45). The handles of cauldrons and wooden vessels are shaped in the forms of a wild boar and a horse (Bezuglov et al. 2009, 24–45. 48–63). The harness ornaments in the form of fish and elk figurines are made locally, specifically for funerals (Bezuglov et al. 2009, 48–63; Volkov/Guguev 1986, 73–74). An imported red-slip ram-shaped vessel was found in a barrow in Rostov-on-Don (Volkov/Guguev 1986, 73–74).

Kuban Region

First Period

Animal images were found in 20 elite burials (38 %) on utilitarian (phalerae; a rhyton; costume items: earrings, neck-rings, bracelets) and extra-utilitarian (ritual plate, quasi-candelabra) objects (**fig. 6**). Sixty-four per cent of the images are »potential victims«. Goat-shaped earrings (**fig. 13, 1-2**) present a series of similar images from at least twelve female flat graves by the middle Kuban and on the Kuban's left bank (Mordvintseva et al. 2010, cat. 112–113. 201. 215–217. 450. 495. 497; Mordvinceva/Treister 2007, cat. A373. A375. A377; Beglova/Erlikh 2018, 81–84. 111–112). The heads of ungulates (deer) are represented on the ends of neck-rings (Mordvintseva et al. 2010, cat. 49–50; Mordvinceva/Treister 2007, cat. A103). Full figures of a deer adorn a quasi-candelabrum from Mezmay (**fig. 13, 7**; Mordvintseva et al. 2012). Some harness decorations feature double horse heads and the »Helios in quadriga« motif (Mordvintseva et al. 2010, cat. 362–391).

All these items come from local workshops. Ritual iron rods ending in deer heads or full figures of deer and, as a rule, with a tripod (quasi-candelabra), were apparently made especially for funerals. Such objects have not yet been found in settlements. It is difficult to judge whether these objects reflected the idea of light in the burial, but they were definitely associated with the high social status of the deceased.

Second Period

Animal images were found in 19 elite funerary complexes (35 %) on utilitarian (phalerae; a sword; a rhyton; a bronze cast cauldron; a spoon; costume details: a diadem, buckles, brooches, earrings, neck-rings, bracelets) and extra-utilitarian (quasi-candelabra; a silver phiale; animal figurines; eye-covers) items

(**fig. 7**). »Potential victims« are depicted in 59 % of the cases, the rest of the characters are predators and monsters.

The image of a goat is depicted on earrings (Mordvintseva et al. 2010, cat. 75–78; Mordvinceva/Treister 2007, cat. A378) and phalerae (**fig. 13, 4**; Mordvinceva/Treister 2007, cat. A39), and a ram is depicted on brooches (**fig. 13, 3**; Mordvintseva et al. 2010, cat. 115; Mordvinceva/Treister 2007, cat. A24). A series of deer images are presented on quasi-candelabra, a phiale and eye-covers (Chernopitskiy 1985; Mordvinceva/Treister 2007, cat. B14; Mordvintseva et al. 2010, cat. 205–212. 331–347. 405–420. 465–479). A figurine of a deer as an amulet was found in a female barrow burial near Kalininskaya (Mordvintseva et al. 2010, cat. 148–149). The ends of neck-rings and bracelets are shaped into the form of a deer or ungulate head (**fig. 13, 5**; Mordvintseva et al. 2010, cat. 105–108. 148–149. 358–361. 600–604). A bull is depicted together with an eagle-griffin on the plaques of the sword-scabbard from the Zubov Barrow (Mordvinceva/Treister 2007, cat. B14) and is represented in the shape of the handles on the cauldron from Peschanyi (Mordvintseva et al. 2010, cat. 405–420). All items are made in local workshops. The quasi-candelabra and gold ritual eye-covers (round plates with the image of a lying deer for placing on the eyes) were intended especially for funerary purposes. The cauldron from Peschanyi was probably used in the sacrificial ritual.

Third Period

Images of animals were found in 16 elite burial complexes (24 %) on utilitarian (tableware; phalerae; costume elements: neck-rings, bracelets, brooches, belt details) and extra-utilitarian (finials; amulet-rings, eye-covers; quasi-candelabra) items (**fig. 8**). Images of a »potential victim« account for 67 %, the rest of the characters are predators and fantastic monsters.

The heads of horses and ungulates adorn a series of neck-rings and bracelets (Mordvinceva/Treister 2007, cat. A4–A5. A120. A306). The eye-covers from Yaroslavskaya depict a lying deer (Mordvinceva/Treister 2007, cat. A166). A frequent motif is the image of a swastika-shaped goat (belt plaques, phalerae, a belt plate; **fig. 13, 6**; Mordvinceva/Treister 2007, cat. A275. A278. A306; Mordvintseva et al. 2010, cat. 59–63). The goat is also depicted on brooches in torment scenes and on amulet-rings (Mordvinceva/Treister 2007, cat. A323. A372). A ceramic vessel (Gushchina/Zasetskaya 1994, 60–61 cat. 290–309) and the handles of silver bowls (Mordvinceva/Treister 2007, cat. A97) are bird-shaped. A red-slip vessel (Gushchina/Zasetskaya 1994, 55 cat. 222–227) and a brooch (Mordvinceva/Treister 2007, cat. A4) depict a ram. A boar's head crowns a finial (Mordvinceva/Treister 2007, cat. A276). A brooch from Khatazhukaevskiy depicts a hare (Mordvinceva/Treister 2007, cat. A323). The red-slip vessels are imports. Other items originated, apparently, from local workshops. Eye-covers, quasi-candelabra and, possibly, amulet-rings were made especially for the funerals.

Fourth Period

Images of animals were found in four elite complexes (17 %) on utilitarian (belt details, plaques) and extra-utilitarian (quasi-candelabra) media (**fig. 9**). All characters belong to the »potential victim« group: overlays in the form of rams' heads (Gushchina/Zasetskaya 1994, 45–46) and birds (Gushchina/Zasetskaya 1994, 68 cat. 427–439), finials of quasi-candelabra shaped into the heads of goats or deer (Mordvintseva et al. 2010, cat. 270–272. 528–531), gold-plated bronze plaques in the form of a goat, a deer, and a hare (Gushchina/Zasetskaya 1994, 72–73 cat. 480–499). All of them were apparently made by local craftsmen for the burials.

Discussion

Most of the »potential victims«, with the exception of domestic pig and tortoise, are represented in the form of full figures or their heads. The heads of animals (deer, wild boar, horse, bull, goat, ram, as well as ungulates of an indeterminate type) were, as a rule, decorative elements of jewellery – pendants, neck-rings, bracelets. Only in isolated cases were images placed on other media (for example, a horse's protome on the phalera from Taganrog).

Full animal figures were depicted as separate motifs and in interaction with other characters on a variety of media – clothing decorations, tableware, weapons, horse harnesses and extra-utilitarian objects. Horse, dog, goat, deer, boar, and bird can be shown as separate figures. All ungulates are represented either standing or lying down with their legs tucked under their bodies (a victim's pose). The ungulate is shown in the same pose when predatory and fantastic animals torment it. In this connection, it is interesting to note that horses were also buried with their legs tucked under their stomachs. The swastika-shaped curled up hoofed animal (ram or goat) obviously represents a special emblem, possibly connected with the idea of sacrifice.

»Potential victims« are also shown in interaction with other animals (»confrontation« and »torment«) and with anthropomorphic characters. In a »confrontation« scene, a predator or a fantastic an-

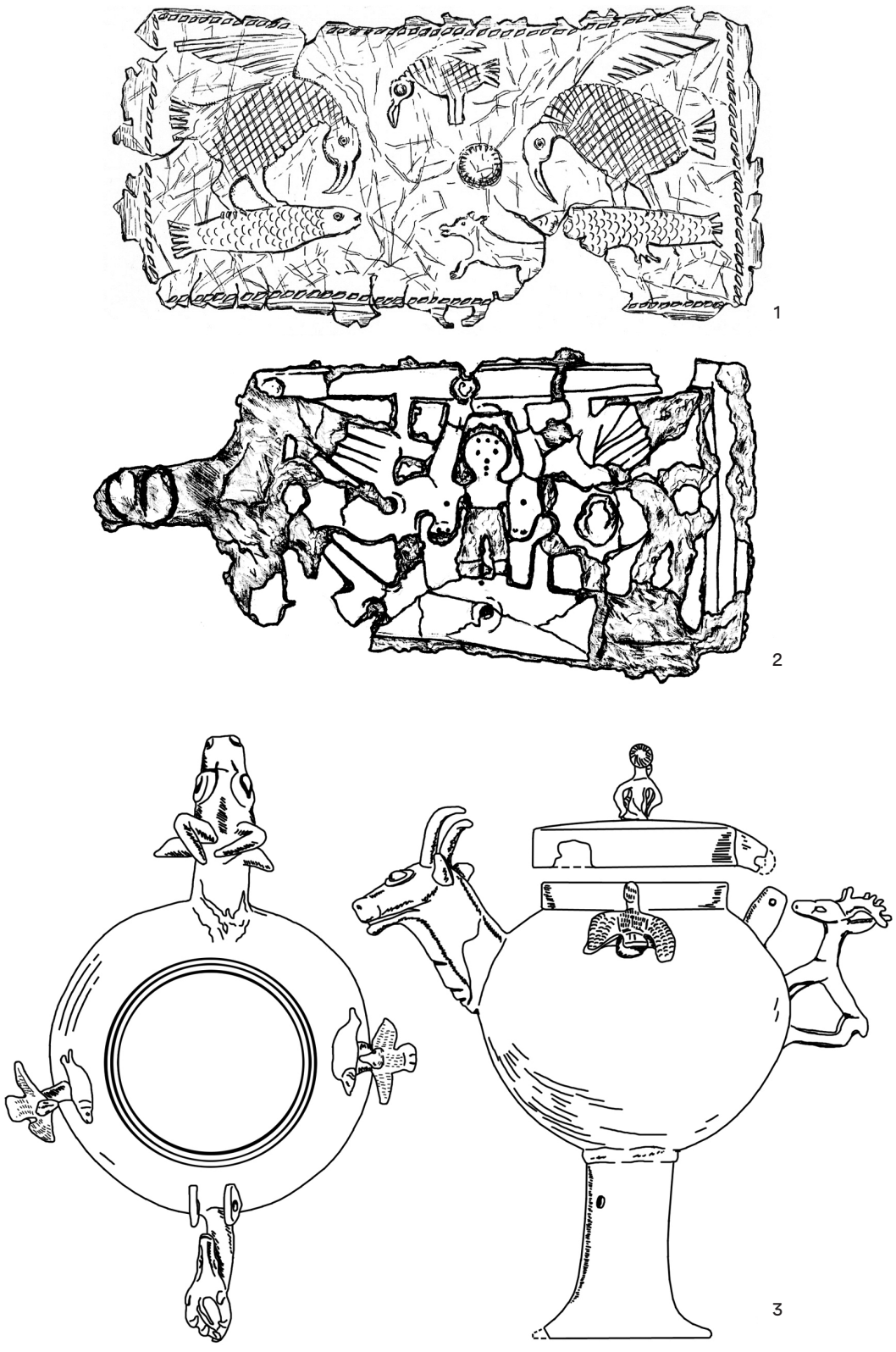

Fig. 10 Animal representations from the elite burial assemblages of the North Pontic region. **1** Veselaya Dolina. – **2** Chisten'koe. – **3** Kal'mius. – (1 after Mordvinceva/Redina 2013; 2 after Zaytsev/Koltukhov 1997; 3 after Mordvinceva 2013).

Fig. 11 Animal representations from the elite burial assemblages of the North Pontic region. **1-2. 5-6** Neapolis Scythian. – **3** Charax. – **4** Belyaus. – **7** Ramazan-Sala. – (1–2. 7 photos V. Mordvintseva; 3–4 after Dashevskaya 2014; 5 after Zaytsev 2004; 6 after Tunkina 2002).

Fig. 12 Animal representations from the elite burial assemblages of the North Pontic region. **1–4** Ust'Al'ma necropolis. – **5** Neysats necropolis. – (Photos V. Mordvintseva).

Fig. 13 Animal representations from the elite burial assemblages of the North Pontic region. **1** Elizavetinskaya. – **2** Lenina. – **3** Starokorsunskaya. – **4** Vozdvizhenskaya. – **5** Elitnyi. – **6** Vodnyi. – **7** Mezmay. – (1–6 photos V. Mordvintseva; 7 after Mordvintseva et al. 2012).

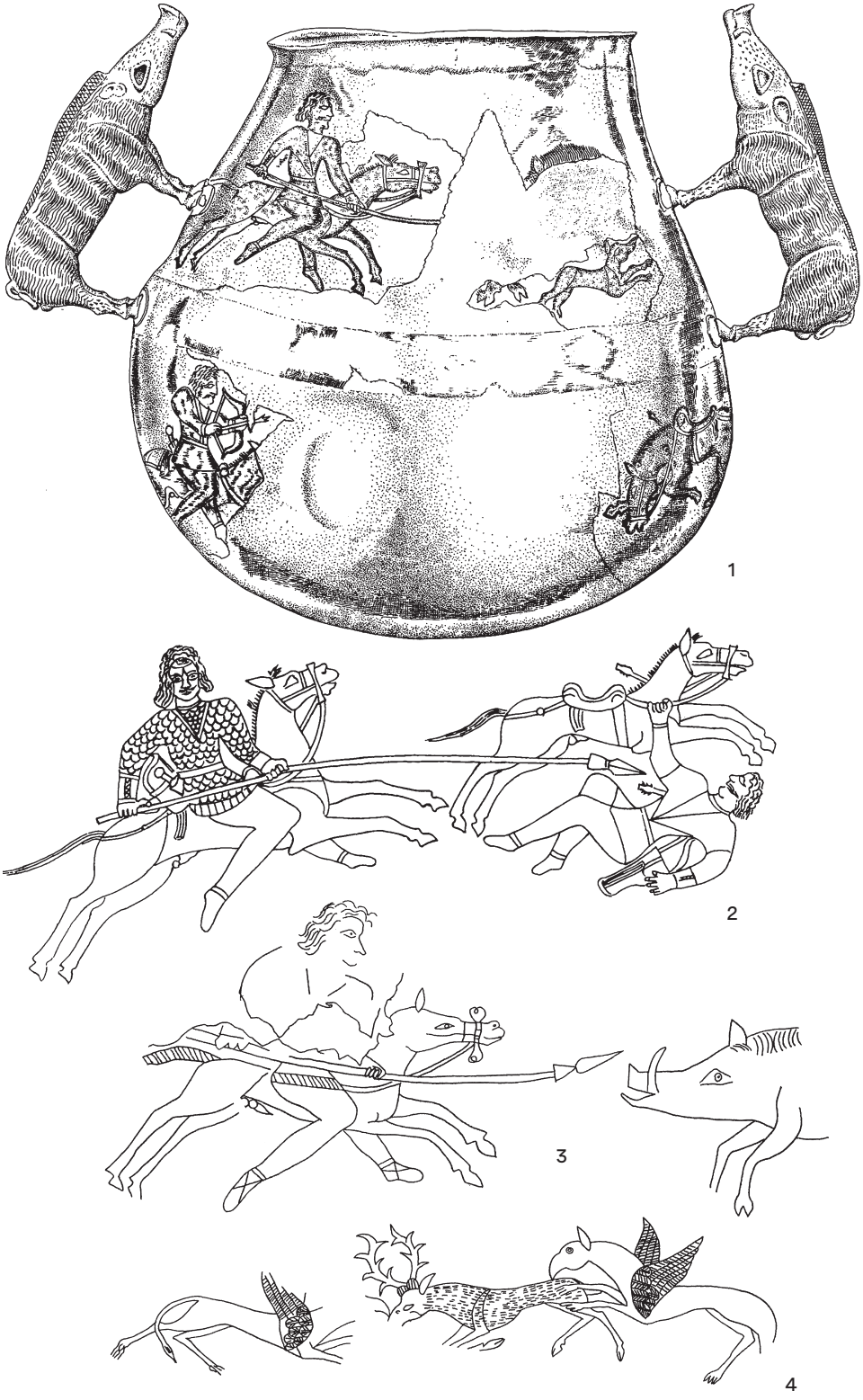

Fig. 14 Animal representations from the elite burial assemblages of the North Pontic region. **1** Kosika. – **2-4** Verbovskiy. – (After Mordvinceva/Treister 2007).

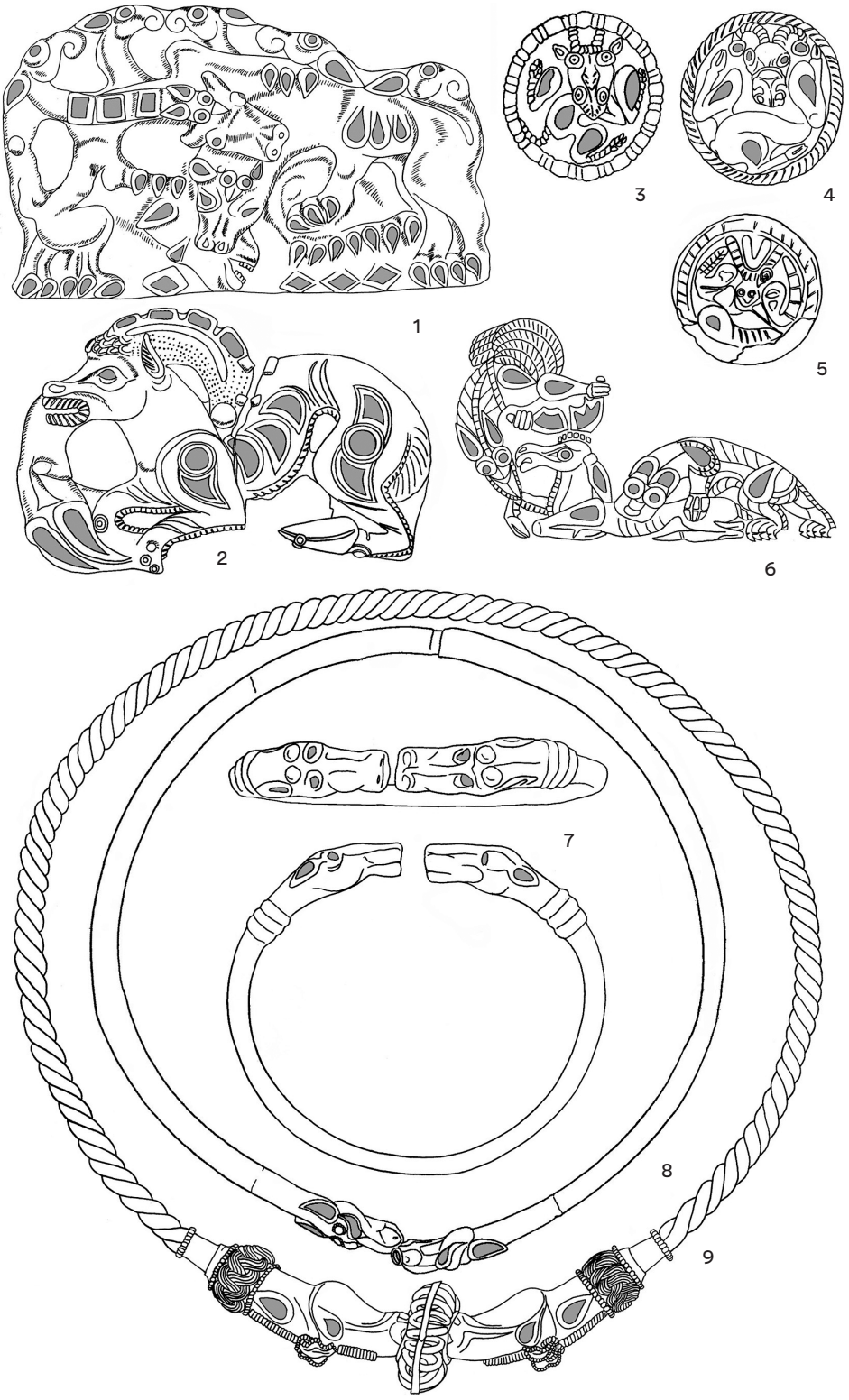

Fig. 15 Animal representations from the elite burial assemblages of the North Pontic region. **1**. **4**. **7** Zaporozhskiy Barrow. – **2** Verkhnee Pogromnoe. – **3** Kirsanovskiy. – **5** Oktyabr'skiy. – **6** Khokhlach Barrow. – **8** Titchikha. – **9** Porogi. – (After Mordvintseva 2003).

imal is depicted facing the »potential victim«. In a »torment« scene, fantastic monsters and predators attack a hoofed animal lying in the pose of a victim.

Only three zoomorphic characters appear in combination with anthropomorphic figures: a horse (rider, hunting scene, scene of a battle of horsemen, »master of animals«, »Helios in quadriga«), a dog (companion of the rider, companion of Artemis), and a boar (hunting scene).

The mapping of various motifs (**figs 6–9**) allows us to trace the following developments:

In the first period (**fig. 6**), two major areas can be distinguished, »eastern« and »western«, which differ in their types of image. The »ungulate in the victim's pose« marks the Kuban region and the northern part of the Volga region. In the territory west of the Don, the »victim« motif is practically absent, with the exception of the Belyaus necropolis in north-western Crimea, where a plaque of Scythian animal style as an amulet was discovered. The motifs of a bull's head and bucrania are recorded only in the Crimea. Animal images in combination with anthropomorphic characters are noted in the sedentary cultures of the Lower Dnieper, Crimea, Lower Don, and the Kuban's left bank.

In the second period (**fig. 7**), the »ungulate in the victim pose« is found, in general, in the same territories: east of the Don and the Kuban region. Three subareas can be distinguished in the »eastern« area: the Kuban region, the Don-Volga interfluve, and the Lower and Middle Volga. In the Kuban region, ritual objects (quasi-candelabra decorated with deer heads) are widely represented in elite burials. In the Lower and Middle Volga, in the territories presumably occupied by nomads, objects with animal images combined with anthropomorphic characters (»master of animals«, »rider«, »horsemen fighting«) appear. In the »western« area, images of the »ungulate in a victim's pose« are absent.

In the third period (**fig. 8**), the boundaries of the »western area« seem to be breached. We observe the distribution of »ungulates in a victim's pose« and neck-rings/bracelet ends in the form of ungulate heads throughout the northern Black Sea region, except the Crimea. The Crimean foothills are also distinguished by the presence of images of horses and dogs in combination with anthropomorphic characters (»rider« motif). The specific motif of a swastika-like curled-up goat marks the area of the Kuban region (»Golden Cemetery«) and the Lower Don up to the bend of the Dnieper.

In the fourth period (**fig. 9**), images of the »ungulate in a victim's pose« are represented exclusively by imported red-slip vessels in the form of a ram in the area from the Dniester to the mouth of the Don. The hand-formed vessels from the Neyzats necropolis in the Crimea (**fig. 12, 5**), which imitated the imported ones, represent, however, standing (!) and not lying animals (so, not in a victim's pose).

Thus, we can conclude that the types of images of the »potential victim« mark, in a way, the cultural-political affiliation of the elites due to their high symbolism. In the regions where the elite burials contain images of animals in combination with anthropomorphic characters there are, as a rule, no images of the »ungulate in victim pose«. The population of these regions was sedentary and practiced agriculture as at least one of the main types of economy. In the culture of this population, a significant influence of Greek urban centres can be traced. This is especially evident in the example of the Crimea. Images of a rider or a deity surrounded by horses are obviously derivatives of motifs widely represented in the pictorial repertoire of the Greek cities of the northern Black Sea region, especially the Bosporan kingdom. Behind such images there was, apparently, a certain narrative, in particular the idea of a horse as a vehicle through which the soul of the dead enters the underworld (Propp 1986, 171–173).

In territories where the distribution of images of the »ungulate in victim pose« (usually a goat or a ram) and scenes of torment were noted, either nomadic lifestock breeding was practiced, or this was one of the main types of economy (Volga-Don and Kuban steppes). It is highly probable that the sedentary population along the Kuban and on the Kuban's left bank shared the ideology of the steppe nomads because they had already been customed to it in earlier (Scythian) times. The images of the »ungulate in victim pose« were obviously also associated with a certain narrative. The appearance of such images to the west of the Don in the 1st century AD is evidence of either the movement of the population in this direction, or the spread of the corresponding ideology. The core territory directly controlled by the elites transmitting these signs and symbols may be marked by the spread of the »swastika-shaped goat« emblem, placed exclusively on some insignia (ceremonial belts, harness decorations). The disappearance of self-produced objects with images of the »ungulate in victim pose« in the fourth chronological period probably indicates the spread of a different ideology in the North Pontic region.

When compared with the results obtained from studying the remains of sacrificial animals, it can be stated that the distribution of economic-cultural and ideological patterns sometimes coincide. Thus, the barbarian population of the Crimean foothills, economically, culturally and ideologically, was extremely close to those of Chersonesos and the Bos-

poran kingdom, and always reacted to the changes taking place there. For at least three chronological periods, the population of the Volga-Don interfluve combined a nomadic or semi-nomadic lifestyle with a certain ideology, including narratives represented by images of »ungulates in victim pose«. The appearance of signs of a nomadic economic and cultural type in the Lower Dnieper region in the third chronological period coincides with the distribution of the corresponding images. In contrast, the settled population of the Kuban region was already familiar with narratives that were apparently formed in a nomadic (and hunting?) environment. To obtain more elaborate characteristics of the ideologies in the North Pontic region, it is necessary to study the entire set of images, including those not containing animals.

Conclusions

A comparative analysis of the remains of sacrificial animals and images of the »potential victim« in the elite burial complexes in the territory of »Sarmatia« has made it possible to identify regions with different patterns in the cult sphere, which could have been formed under the influence of certain economic, cultural, and ideological factors.

When studying the sacrificial remains in elite burial assemblages, several patterns were identified. The absence of horse bones in the presence of horse harnesses can be noticed for the Lower Dnieper and western part of the Volga-Don region in the first and second periods. The combination »sheep leg + knife« was typical for the barrow burials in the steppe part of the Volga-Don interfluve in all periods and on the Kuban's right bank in the first and second periods, as well as for the Kuban region flat burials in the second and third periods and northwestern Crimea in the first period. The combination »horse/cattle bones + bronze cast cauldron« are characteristic for the uppermost elites of the Volga-Don region from the first to the third chronological period. The combination »cattle leg + plate« spread in the Crimean foothills from the second to fourth periods and in the Kuban region in the first and second periods. Burials of a »full animal«, »partial animal« or »stuffed animal« (horse, cattle, dog) took place in the Crimean foothills in all periods, the Kuban region in the first, second and fourth periods, the Dnieper's bend in the third period and the Don delta in the fourth period. The choice of the victim was largely determined by the ecological and cultural environment, and the observed patterns mark the cultural and economic affiliation of the population.

Among images of the »potential victim«, two meaningful patterns were identified: the »ungulate in victim pose« (by itself or in a torment scene) and the image of an animal (horse, dog, wild boar) in combination with anthropomorphic characters (»rider«, »horsemen fighting«, »master of animals«, »Helios in quadriga«). For the first and second periods, two large distribution areas of these patterns are distinguished: »western« – with subareas: 1) the Crimea, and 2) the Lower Dnieper and the western part of the Volga-Don region), and »eastern« – with subareas: 1) the eastern part of the Volga-Don region and the Kuban's right bank, and 2) the Kuban's left bank). In the third period, the »eastern« area expands westwards. In the fourth period, the »eastern« pattern practically disappears.

Thus, the population of »Sarmatia« was not ideologically unified; it consisted of several elite groups that can be preliminarily identified as representatives of »nomadic« and »agricultural« ideologies. The »nomadic« component intensified in the 1st century AD, possibly as a result of changes in the foreign policy balance, and the emergence of new nomadic associations in the western part of the Eurasian steppe, which maintained close contacts with the Parthian rulers (Mordvintseva 2023, 69–70). The settled population of »Sarmatia« was in contact with and influenced by the urban centres of Greek and later Roman civilizations. This influence in the second half of the 2nd century AD turned out to be decisive, perhaps because of the successful conquests of the Bosporan rulers, especially Sauromates II (Anokhin 1999, 153–155).

Bibliography

Anokhin 1989: V. Anokhin, Монеты античных городов Северо-Западного Причерноморья (Kiev 1989).

1999: V. Anokhin, История Боспора Киммерийского (Kiev 1999).

Beglova/Erlikh 2018: E. Beglova / V. Erlikh, Меоты Закубанья в сарматское время (по материалам Тенгинского могильника) (Moskva, Sankt-Peterburg 2018).

Berkhin 1959: I. Berkhin, Сарматское погребение у с. Саломатина. Сообщения Государственного Эрмитажа 15, 1959, 37–41.

Berlizov/Anfimov 2005: N. Berlizov / I. Anfimov, Могильники среднего Прикубанья эпохи позднего эллинизма и римского времени (по материалам рукописного архива Н. В. Анфимова). Мат. по ист. и арх. Северного Кавказа 5, 2005, 113–125.

Bespaly 1986: E. Bespaly, Barrows with Roman Imports excavated by the Expedition of the Azov Regional Museum in 1979–84. In: B. Raev (ed.), Roman Imports in the Lower Don Basin. BAR Internat. Ser. 278 (Oxford 1986) 75–78.

1990: E. Bespaly, Погребения позднесарматского времени у г. Азова. Советская арх. 1, 1990, 213–223.

1992: E. Bespaly, Курган сарматского времени у г. Азова. Советская арх. 1, 1992, 175–190.

2000: E. Bespaly, Позднесарматское погребение из могильника Высочино V на водоразделе между Кагальником и Доном. In: Yu. Guguev (ed.), Сарматы и их соседи на Дону. Материалы и исследования по археологии Дона 1 (Rostov-na-Dony 2000) 156–168.

Bespaly/Luk'ashko 2008: E. Bespaly / S. Luk'ashko, Древнее население междуречья Дона и Кагальника. Курганный могильник у с. Высочино (Rostov-na-Dony 2008).

Beylekchi 1998: V. Beylekchi, Фалары села Твардица (Rostov Velikiy 1998).

Bezuglov et al. 2009: S. Bezuglov / V. Glebov / I. Parusimov, Позднесарматские погребения в устье Дона. Курганный могильник Валовый I (Rostov-na-Dony 2009).

Bulatov et al. 1975: N. Bulatov / V. Dvornichenko / S. Korenevskiy / N. Malinovskaya / G. Fyodorov-Davydov, Раскопки курганов в Черноярском районе Астраханской области. In: Археологические открытия в 1974 г. (Moskva 1975) 139–140.

Bylkova 2007: V. Bylkova, Нижнее Поднепровье в античную эпоху (по материалам раскопок поселений) (Kherson 2007).

Chernopitskiy 1985: M. Chernopitskiy, Курган с погребением »жрицы« на Кубани. Советская арх. 3, 1985, 251–255.

Dashevskaya 2014: O. Dashevskaya, Некрополь Беляуса (Simferopol' 2014).

Dvornichenko/Fyodorov-Davydov 1989: V. Dvornichenko / G. Fyodorov-Davydov, Памятники сарматской аристократии в Нижнем Поволжье. In K. Smirnov (ed.), Сокровища сарматских вождей и древние города (Moskva 1989) 5–13.

Dvornichenko et al. 2002: V. Dvornichenko / V. Plakhov / I. Sergatskov, Сарматские погребения у поселка Комсомольский Астраханской области. Нижневолжский арх. вестник 5, 2002, 225–250.

Glebov 2002: V. Glebov, Погребение с монетами из могильника из могильника Шаумяна и вопросы хронологии среднесарматской культуры. Донская арх. 1/2, 2002, 28–41.

Gudkova/Fokeev 1984: A. Gudkova / M. Fokeev, Земледельцы и кочевники в низовьях Дуная 1–4 вв. н.э. (Kiev 1984).

Guguev/Bezuglov 1990: V. Guguev / S. Bezuglov, Всадническое погребение первых веков нашей эры из курганного могильника Кобякова городища на Дону. Советская арх. 2, 1990, 164–175.

Gushchina/Zasetskaya 1989: I. Gushchina / I. Zasetskaya, Погребения зубовско-воздвиженской группы из раскопок Н.И. Веселовского в Прикубанье (1 в. до н.э. – 2 в. н.э.). In: M. Abramova (ed.), Археологические исследования на юге Восточной Европы (Moskva 1989) 71–141.

1994: I. Gushchina / I. Zasetskaya, »Золотое кладбище« римской эпохи в Прикубанье (Sankt-Peterburg 1994).

Gushchina/Zhuravlyov 1999: I. Gushchina / D. Zhuravlyov, Погребения с бронзовой посудой из могильника Бельбек IV в Юго-Западном Крыму. Российская арх. 2, 1999, 157–171.

Il'yukov 1994: L. Il'yukov, Сарматские курганы окрестностей Танаиса (могильник »Царский«). Вестник Танаиса 1, 1994, 198–215.

Il'yukov/Vlaskin 1992: L. Il'yukov / M. Vlaskin, Сар маты междуречья Сала и Маныча (Rostov-na-Dony 1992).

Kamenetskiy 1974: I. Kamenetskiy, Итоги исследования Подазовского городища (Moskva 1974).

2011: I. Kamenetskiy, История изучения меотов (Moskva 2011).

Karyshkovskiy/Kleyman 1985: P. Karyshkovskiy / I. Kleyman, Древний город Тира (Kiev 1985).

Khrapunov 2007: I. Khrapunov, Погребение воина 2 в. н.э. из могильника Опушки. In: Y. Zaytsev / V. Mordvintseva (eds), Древняя Таврика (Simferopol' 2007) 115–124.

2013a: I. Khrapunov, Several Results of the Researches of the Cemetery of Neyzats. In: I. Khrapunov (ed.), Exploring the Cemetery of Neyzats (Simferopol, Kristiansand 2013) 13–72.

2013b: I. Khrapunov, Die Nekropole von Neisatz. In: Müller/Schmauder 2013, 340–351.

2016: I. Khrapunov, Поселение в Барабановской балке (2–4 вв. н.э.) (Simferopol' 2016).

Khrapunov/Shabanov 2021: I. Khrapunov / S. Shabanov, Погребения коней в могильнике Опушки. Stratum plus 4, 2021, 49–60.

Khrapunov et al. 2001: I. Khrapunov / A. Stoyanova / S. Muld, Позднескифский могильник у с. Левадки. In: Yu. Mogarichev / I. Khrapunov (eds), Бахчисарайский ист.-арх. сборник 2 (Simferopol' 2001) 105–168.

Khrshanovskiy 2000: V. Khrshanovskiy, Жертвоприношение в погребально-поминальной обрядности Европейского Боспора 2 в. до н.э. – 4 в. н.э. (по материалам археологических раскопок некрополей Илурата и Китея). In: L. Akimova / A. Kifishin (eds), Жертвоприношение. Ритуал в искусстве и культуре от древности до наших дней (Moskva 2000) 241–252.

Korpusova 1983: V. Korpusova, Некрополь Золотое (Kiev 1983).

Kostenko 1993: V. Kostenko, Сарматы в Нижнем Поднепровье (Dnepropetrovsk 1993).

Kurchatov/Bubulich 2003: S. Kurchatov / V. Bubulich, Сарматское погребение из кургана у с. Олонешты – 40 лет спустя. In: E. Sava (ed.), Взаимодействие культур и хронология Северо-Понтийского региона (Kishinev 2003) 285–312.

Larenok 2008a: V. Larenok, Меотские древности. Каталог погребальных комплексов Кобякова городища из раскопок 1999–2000 гг. 1 (Rostov-na-Dony 2008).

2008b: V. Larenok, Спасательные раскопки некрополя Кобякова городища на площадке строительства торгового комплекса »Metro cash and carry« по ул. 40-летия Победы в г. Ростове-на-Дону в 2007 г. Отчет (Rostov-na-Dony 2008).

Loboda et al. 2002: I. Loboda / A. Puzdrovskij / J. Zajcev, Prunkbestattungen des 1. Jh. n. Chr. in der Nekropole Ust'-Al'ma auf der Krim. Die Ausgrabungen des Jahres 1996. Eurasia Ant. 8, 2002, 295–346.

Lowry 2005: B. H. Lowry, Animal Sacrifice and Feasting in Celtic Gaul: Regional Variation, Costly Signaling, and Symbolism [Master's Thesis, Univ. Wisconsin 2005].

Lukashov/Pryamukhin 2002: A. Lukashov / A. Pryamukhin, Савромато-сарматские погребения у с. Белокаменка. Нижневолжский арх. вестник 5, 2002, 201–224.

Lyakhov/Mordvintseva 2000: S. Lyakhov / V. Mordvintseva, Раннесарматское погребение у поселка Питерка. Российская арх. 3, 2000, 102–110.

Lysenko 2003: A. Lysenko, Пещерные некрополи Горного Крыма эпохи раннего железа- позднеантичного времени (9 в. до н.э. – 4 в. н.э.). Vita Ant. 5–6, 2003, 85–107.

2005: A. Lysenko, Новое поселение римского времени на Южном берегу Крыма. In: M. Vakhtina / S. Kashaev / O. Sokolova / V. Khrashanovskiy (eds), Боспорский феномен: проблема соотношения письменных и археологических источников (Sankt-Peterburg 2005) 230–236

2009: A. Lysenko, Святилища римского времени южной части Горного Крыма (опыт систематизации). Stratum plus 4, 2005–2009, 374–400.

2010: A. Lysenko, »Поселения« римского времени Алуштинской долины. Арх. альманах 22, 2010, 259–277.

2012: A. Lysenko, О формировании нумизматического комплекса святилища римского времени в Аутке (Южный Крым). Stratum plus 6, 2012, 81–104.

2013: A. Lysenko, Das Heiligtum Eklizí-Burún der römischer Zeit. In: Müller/Schmauder 2013, 276–283.

Lysenko/Serdyuk 2023: A. Lysenko / N. Serdyuk, Фаунистические остатки из святилища позднеэллинистического – римского времени Эклизи-Бурун (Южный Крым). История и арх. Крыма 19, 2023, 164–181.

Marchenko 1996: I. Marchenko, Сираки Кубани (Krasnodar 1996).

Mantsevich 1982: A. Mantsevich, Finds in the Zaporozhe Barrow: New Light on the Siberian Collection of Peter the Great. Am. Journal Arch. 86, 1982, 469–474.

Maslennikov 1981: A. Maslennikov, Население Боспорского государства в VI–II вв. до н.э. (Moskva 1981).

Mauss 2000: M. Mauss, Социальные функции священного (Sankt-Peterburg 2000).

Moleva 1998: N. Moleva, Собака в религиозных представлениях боспорян. In: V. Khrashanovskiy (ed.), Боспорское царство как историко-культурный феномен (Sankt-Peterburg 1998) 60–62.

Mordvinceva 2001: V. Mordvinceva, Sarmatische Phaleren. Arch. Eurasien 11 (Rahden/Westf. 2001).

2013: V. Mordvinceva, Der Fund vom Kalmius. In: Müller/Schmauder 2013, 408–411.

Mordvinceva/Redina 2013: V. Mordvinceva / E. Redina, Der Depotfund von Veselaja Dolina. In: Müller/Schmauder 2013, 394–401.

Mordvinceva/Treister 2007: V. Mordvinceva / M. Treister, Toreutik und Schmuck im nördlichen Schwarzmeergebiet (2. Jh. v. Chr. – 2. Jh. n. Chr.) (Simferopol, Bonn 2007).

Mordvintseva 2000: V. Mordvintseva, The Bronze Ornaments of the Hellenistic Period from Bubuech (Moldova). Kölner Jahrb. 33, 2000, 291–297.

2003: V. Mordvintseva, Полихромный звериный стиль (Simferopol' 2003).

2015: V. Mordvintseva, Сарматы, Сарматия и Северное Причерноморье. Вестник древней истории 1, 2015, 109–135.

2017: V. Mordvintseva, The Sarmatians in the Northern Black Sea region (on the basis of archaeological material). In: V. Kozlovskaya (ed.), The Northern Black Sea in Antiquity: Networks, Connectivity, and Cultural Interactions (Cambridge 2017) 233–282.

2020: V. Mordvintseva, Non-Urban Societies of the Crimea and Their Response to Changes in the External World (Based on the Basis of Élites from the 3rd Century BC to the mid-3rd Century AD). Ancient Civilizations from Scythia to Siberia 26(1), 2020, 25–82.

2023: V. Mordvintseva, Prestige Goods as Markers of Network Relations of the Volga-Don Élites (from the 3rd c. BC to the mid-3rd c. AD). Ancient Civilizations from Scythia to Siberia 29(1), 2023, 38–85.

Mordvintseva/Khabarova 2006: V. Mordvintseva / N. Khabarova, Древнее золото Поволжья (Simferopol' 2006).

Mordvintseva/Shinkar 1999: V. Mordvintseva / O. Shinkar, Сарматские парадные мечи из фондов Волгоградского областного краеведческого музея. Нижневолжский арх. вестник 2, 1999, 138–149.

Mordvintseva/Zaitsev 2003: V. Mordvintseva / Y. Zaitsev, Nogaichinskiy Burial Mound. Ancient Civilizations from Scythia to Siberia 3/4, 2003, 193–257.

Mordvintseva et al. 2010: V. Mordvintseva / E. Khachaturova / T. Yurchenko, Сокровища древней Кубани (Krasnodar 2010).

2012: V. Mordvintseva / Y. Zaytsev / N. Shevchenko, Princely Burial of the Hellenistic Period in the Mezmay Burial-Ground (North-Western Caucasus). Ancient Civilizations from Scythia to Siberia 18, 2012, 281–399.

2016: V. Mordvintseva / A. Lysenko / V. Masyakin, Female Elite Grave in the Necropolis Luchistoe-2 (Southern Crimea). Ancient Civilizations from Scythia to Siberia 22, 2016, 199–261.

Moshkova 2009: M. Moshkova (ed.), Позднесарматская культура. Статистическая обработка погребальных памятников Азиатской Сарматии 4 (Moskva 2009).

Müller/Schmauder 2013: S. Müller / M. Schmauder (eds), Die Krim. Goldene Insel im Schwarzen Meer. Griechen – Skythen – Goten [exhibition cat. Bonn] (Frankfurt a. M. 2013).

Mys'kov et al. 1999: E. Mys'kov / A. Kiyashko / A. Skripkin, Погребение сарматской знати с Есауловского Аксая. Нижневолжский арх. вестник 2, 1999, 149–167.

Myts et al. 1999. V. Myts / A. Lysenko / S. Zhuk, Пещерный позднеантичный некрополь на горе Ай-Никола. Херсонесский сборник 10, 1999, 169–180.

Novichenkova 2002: N. Novichenkova, Устройство и обрядность святилища у перевала Гурзуфское Седло (Yalta 2002).

Novičenkova 2013: N. Novičenkova, Das Heiligtum am Pass Gurzufskoe Sedlo. In: Müller/Schmauder 2013, 260–275.

Otchir-Goriaeva 2002: M. Otchir-Goriaeva, Das sarmatische Grab von Jaškul', Kalmykien. Eurasia Ant. 8, 2002, 353–388.

Podosinov 2002: A. Podosinov, Восточная Европа в римской картографической традиции. Тексты, перевод, комментарий (Moskva 2002).

Pogrebova 1958: N. Pogrebova, Позднескифские городища на Нижнем Днепре. In: K. Smirnov (ed.), Памятники скифо-сарматского времени в Северном Причерноморье. Материалы и исследования по арх. СССР 64 (Moskva 1958) 103–247.

1961: N. Pogrebova, Погребения в мавзолее Неаполя Скифского. In: K. Smirnov (ed.), Памятники бронзы и раннего железа в Северном Причерноморье. Материалы и исследования по арх. СССР 96 (Moskva 1961) 103–213.

Polit 2019: B. Polit, Canine burials from the Roman period on the northern Black Sea coast in the light of materials from the Neyzats cemetery. Przegląd Arch. 67, 2019, 149–176.

Propp 1986: V. Propp, Исторические корни волшебной сказки (Leningrad 1986).

Puzdrovskiy 2007: A. Puzdrovskiy, Крымская Скифия во II в. до н.э. – III в. н.э. (Simferopol' 2007).

Puzdrovskiy/Trufanov 2017a: A. Puzdrovskiy / A. Trufanov, Полевые исследования Усть-Альминского некрополя в 2004–2007 гг. (Simferopol', Moskva 2017).

2017b: A. Puzdrovskiy / A. Trufanov, Полевые исследования Усть-Альминского некрополя в 2000–2003 гг. (Simferopol', Moskva 2017).

Puzdrovskij/Zajcev 2004: A. Puzdrovskij / J. Zajcev, Prunkbestattungen des 1. Jhs n. Chr. in der Nekropole Ust'-Al'ma, Krim. Die Grabungen des Jahres 1999. Eurasia Ant. 10, 2004, 229–267.

Raev 1986: B. Raev (ed.), Roman Imports in the Lower Don Basin. BAR Internat. Ser. 278 (Oxford 1986).

Rau 1927: P. Rau, Die Hügelgräber Römischer Zeit an der unteren Wolga (Pokrowsk 1927).

Rostovtzeff 1922: M. Rostovtzeff, Iranians and Greeks in South Russia (Oxford 1922).

1973: M. Rostovtzeff, The Animal Style in South Russia and China (New York 1973).

Sanzharov 1986: S. Sanzharov, Раскопки курганов в Донбассе. In: Арх. открытия 1985 г. (Moskva 1973) 304–305.

Savchenko 1994. E. Savchenko, Комплексы сарматского времени у ст. Калининской. Боспорский сборник 5, 1994, 87–107.

Sazonov 1992: A. Sazonov, Могильник первых веков нашей эры близ хутора Городского. In: N. Anfimov (ed.) Вопросы археологии Адыгеи (Maykop 1992) 241–271.

Serdyuk 2003: N. Serdyuk, Диагностика изображений животных на предметах сарматского полихромного звериного стиля. In: V. Mordvintseva, Полихромный звериный стиль (Simferopol' 2003) 96–98.

Sergatskov 2000: I. Sergatskov, Сарматские курганы на Иловле (Volgograd 2000).

2002: I. Sergatskov, Анализ сарматских погребальных памятников 1–2 вв. н.э. In: M. Moshkova (ed.), Среднесарматская культура. Статистическая обработка погребальных памятников Азиатской Сарматии 3 (Moskva 2002) 22–129.

2009: I. Sergatskov, Клад 2 в. до н.э. из окрестностей станицы Качалинской. Российская арх. 4, 2009, 149–159.

Shilov 1975: V. Shilov, Очерки по истории древних племен Нижнего Поволжья (Leningrad 1975).

Simonenko 1993: A. Simonenko, Сарматы Таврии (Kiev 1993).

2008: A. Simonenko, Römische Importe in sarmatischen Denkmälern des nördlichen Schwarzmeergebiets. In: A. Simonenko / I. Marčenko / N. Limberis, Römische Importe in sarmatischen und meotischen Gräbern. Arch. Eurasien 25 (Mainz 2008) 1–264.

Sinitsyn 1946: I. Sinitsyn, К материалам по сарматской культуре на территории Нижнего Поволжья. Советская арх. 8, 1946, 73–95.

Skripkin 1997: A. Skripkin, Анализ сарматских погребальных памятников III – I вв. до н.э. In: M. Moshkova (ed.), Раннесарматская культура. Статистическая обработка погребальных памятников Азиатской Сарматии 2 (Moskva 1997) 131–212.

2017: A. Skripkin, Сарматы (Volgograd 2017).

Skvortsov/Skripkin 2008: N. Skvortsov / A. Skripkin, Погребение сарматской знати из Волгоградского Заволжья. Нижневолжский арх. вестник 9, 2008, 98–116.

Smirnov 1953: K. Smirnov, Северский курган (Moskva 1953).

1959: K. Smirnov, Курганы у сел Иловатка и Политотдельское. In: E. Krupnov (ed.), Древности Нижнего Поволжья. Материалы и исследования по арх. СССР 60 (Moskva 1959) 206–322.

1976: K. Smirnov, Савромато-сарматский звериный стиль. In: A. Melyukova / M. Moshkova (eds), Скифо-сибирский стиль в искусстве народов Евразии (Moskva 1976) 74–89.

1997: Yu. Smirnov, Лабиринт. Морфология преднамеренного погребения (Moskva 1997).

Symonovich 1983: E. Symonovich, Население столицы позднескифского царства (Kiev 1983).

Tchlenova 1962: N. Tchlenova, L'art animalier de l'époque scythique en Sibérie et en Pontide. VI Congrès international des sciences préhistoriques et protohistoriques. Les rapports et les informations des archèoloques de l'URSS (Moscou 1962).

Tokhtas'ev 2005: S. Tokhtas'ev, »Sauromatae – Sarmatae – Syrmatae«. Херсонесский сборник 14, 2005, 291–306.

Treister 1994: M. Treister, Сарматская школа художественной торевтики. Вестник древней истории 1, 1994, 172–203.

Tsalkin 1960: V. Tsalkin, Домашние и дикие животные Северного Причерноморья. In: A. Smirnov (ed.), История скотоводства в Северном Причерноморье. Материалы и исследования по арх. СССР 53 (Moskva 1960) 7–109.

Ulf 2009: Ch. Ulf, Rethinking Cultural Contacts. Ancient West and East 8, 2009, 81–132.

Vereshchagin 2008: V. Vereshchagin, Отчет об археологических работах на территории некрополя Кобякова городища в городе Ростов-на-Дону в 2008 году (Rostov-on-Don 2008).

Volkov/Guguev 1986: I. Volkov / Y. Guguev, A Late Sarmatian Burial in Rostov-on-Don. In: B. Raev (ed.), Roman Imports in the Lower Don Basin. BAR Internat. Ser. 278 (Oxford 1986) 73–74.

Voloshinov 2004: A. Voloshinov, К вопросу о датировке т.н. »рельефа конного Палака« (в контексте позднескифской и боспорской скульптуры первых веков н.э.). In: S. Koltukhov / S. Lantsov / A. Puzdrovskiy (eds), У Понта Евксинского (Simferopol' 2004) 139–156.

Vyaz'mitina 1972: M. Vyaz'mitina, Золотобалковский могильник (Kiev 1972).

Vysotskaya 1976: T. Vysotskaya, Культы и обряды поздних скифов. Вестник древней истории 3, 1976, 51–73.

1979: T. Vysotskaya, Неаполь – столица государства поздних скифов (Kiev 1979).

Zasetskaya 1980: I. Zasetskaya, Изображение »пантеры« в сарматском искусстве. Советская арх. 1, 1980, 46–55.

1989: I. Zasetskaya, Проблемы сарматского звериного стиля. Советская арх. 3, 1989, 35–47.

Zasetskaya et al. 1999: I. Zasetskaya / L. Il'yukov / V. Kosyanenko, Среднесарматский погребальный комплекс у хут. Алитуб. Донская арх. 2, 1999, 51–60.

Zaytsev 2000: Y. Zaytsev, »Склеп жриц« Усть-Альминского некрополя. In: L. Akimova / A. Kifishin (eds), Жертвоприношение. Ритуал в искусстве и культуре от древности до наших дней (Moskva 2000) 294–319.

2004: Y. Zaytsev, The Scythian Neapolis (2nd century BC to 3rd century AD). Investigations into the Graeco-

Barbarian city on the northern Black Sea coast. BAR Internat. Ser. 1219 (Oxford 2004).

Zaytsev/Koltukhov 2004: Y. Zaytsev / S. Koltukhov, Погребение воина эллинистического времени у с. Чистенькое в предгорном Крыму. Боспорские исследования 7, 2004, 242–259.

Zaytsev/Mordvintseva 2002: Yu. Zaytsev / V. Mordvintseva, Деревянные сосуды из Усть-Альминского некрополя. In: B. Raev (ed.), Античная цивилизация и варварский мир (Krasnodar 2002) 57–67.

2007: Yu. Zaytsev / V. Mordvintseva, »Элитный некрополь« 2 в. н.э. у центральных ворот Неаполя скифского. In: Yu. Zaytsev / V. Mordvintseva (eds), Древняя Таврика (Simferopol' 2007) 81–108.

Zdanovich 2005: D. Zdanovich, Жертвоприношение животных в погребальном обряде населения степного Зауралья эпохи средней бронзы. Автореферат диссертации на соискание ученой степени кандидата исторических наук (Jekaterinburg 2005).

Zhuravlyov 1991: O. Zhuravlyov, Животноводство и охота у населения скифских городищ Нижнего Поднепровья. In: A. Gavrilov (ed.), Проблемы археологии Северного Причерноморья (к 100-летию основания Херсонского музея древностей) (Kherson 1991) 75–85.

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Yury Esin

Birds of Prey in the Art of Early Asian Herders and the Problem of the Origins of Falconry

ABSTRACT

This paper studies a series of the most ancient bird of prey images associated with Asian steppe, forest-steppe and arid zone herders. They date back to the mid-3rd to early 2nd millennium BC and have been recorded in the territory between the Amu Darya river in the west and the Yenisei river in the east, in present-day Uzbekistan, Kazakhstan, Mongolia, and Russia. Certain similarities in iconography and style and the relative synchronicity of the spread reflect complex local and interregional interaction across this part of the continent and some herder groups' movement from the west to the east, as well as their contacts with the agricultural communities of western central Asia. The increased importance of the bird of prey in the life and beliefs of the herders, recorded in petroglyphs and portable art, and its role in some visual compositions do not exclude that the first practice of training it for hunting occurred at this time. The earliest form of falconry was apparently the foot falconry, while horseback falconry, well known today in the culture of the Asian herders, is undoubtedly a later form, dating back to the first millennium BC.

KEYWORDS

Asian steppe / Early Bronze Age / Early Iron Age / rock art / bird of prey / foot falconry / horseback falconry

Introduction

In recent years, the history of falconry, which refers to the taking of quarry in its natural state and habitat by means of trained birds of prey (Definition of the International Association for Falconry and Conservation of Birds of Prey: www.iaf.org), became a subject of targeted studies by experts from different fields of knowledge (Gersmann/Grimm 2018; Grimm 2020). The emergence of this practice has not been well understood so far, even though the hypothesis of a steppe origin seems most likely (Soma 2015; Gersmann/Grimm 2024). At the same time, studies of materials from the early steppe societies themselves are still rare and are mostly limited to separate cultures or even sites, and it is not clear when the tradition first emerged.

Some researchers, referring to the cases where bird bones were discovered in barrows, sanctuaries, and settlements connect it with the cultures of the Saka and Sarmatians at one point or another in the 1st millennium BC (Samashev et al. 2007; Kosintsev/Nekrasov 2018; Yablonsky 2018; Nagler 2020). The earliest finds of this kind date back to the 8th–7th century BC (Omarov et al. 2024). However, the difficulty lies in that there is no complete certainty that the birds (sometimes only represented by separate parts) were associated with humans and were not wild, since no distinctive tools related to falconry were found at the sites. The latter, however, may be due to the fact that these were made of perishable materials – leather and wood (Wang et al. 2023, 8).

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The possibilities of solving this problem using stable isotope analysis seem quite distant at present (Pokrovsky 2018). Some observations made by archaeozoologists on the European medieval material (Prummel 2018) about the predominance of females among hunting birds (which are larger than males), plus cases of pathological changes in the metatarsal bone and fracture healing, may be more useful for modern research.

Another archaeological source is visual materials. Among them, the strongest evidence for falconry is a composition in which a bird of prey is depicted perching on an arm, especially on a rider's arm (Grimm/Gersmann 2018, figs 1–5), as many researchers associate falconry with horseback riding (see, for example: Reiter 2018c, 1659). Sometimes it is supplemented by another important piece of evidence – images of traditional falconry equipment known from present-day Turkic and Mongolian people: a leash for the legs, a hood for the bird's head, a glove for the hunter's arm, etc. One of the earliest known depictions of a bird of prey on a rider's fist is on a bronze belt plaque from Xichagou 西岔沟 cemetery (Z115) in north-eastern China[1] (**fig. 1a**). This plaque undoubtedly shows characters from some heroic epic. They are depicted sitting on mythical beasts instead of normal horses, but their clothing, weapons and harnesses are realistic (**fig. 1b**) and correspond well to the historical period of the burial. This cemetery's main temporal range covers the second half of the 2nd century to the mid-1st century BC, and it was most likely a burial site for the Wuhuan 烏桓, who were under the influence of the Xiongnu 匈奴 (Pan et al. 2020). It became the basis for the conclusion about the origin of falconry during the Xiongnu period in the eastern part of the Asian steppe (Bunker et al. 1997, 80; Soma 2015). On the belt plaque one rider is shown on a tiger (which has three tongues or is holding something in its teeth), and the other one sits on a beast with the body of a horse, but with a horn (shown in the form of a bird of prey's beak) at the end of the muzzle, two bull's tails (?), and the claws and ears of a predator. The beast with the horse's mane and a horn is especially indicative. It has some parallels in the art and myths of the Xianbei 鮮卑 of the early 1st millennium AD (Komissarov 1996; Bunker et al. 1997, 279 figs W16–W17), who considered such a beast to be their main symbol and divine protector. It also corresponds to the 4th–3rd-century BC descriptions of the Bo 駁 or Bo-Horse, the form of which resembles a horse but with a white body, an ox's tail (some commentators mentioned two or three tails), a single horn, and a tiger's teeth and claws, that lived in the northern and western mountains according to the *Shanhaijing* 山海經 »Classic of Mountains and Seas« (Strassberg 2002, 116. 127). The Xianbei and Wuhuan, who dwelled north of the ancient Chinese states, were close relatives (both belonged to the Eastern Hu 東胡 and most likely were proto-Mongol) and apparently shared some beliefs and narratives. At the same time, the image of this divine beast identified on the belt plaque from Xichagou is different from the known Xianbei iconography and style. This is an additional argument in favor of the Wuhuan origin of the find. Moreover, the rider on the horse with a horn, whom we can tentatively associate with the Xianbei, is shown as having a slightly lower status than the rider on the tiger (whose sword is larger, who looks a little older and rides first), so the first rider and his beast must presumably be associated with the Wuhuan itself. In this case, perhaps the riders shown are related to the genealogical myth of the Wuhuan and Xianbei and represent their ancestors (possibly two brothers).]

A similar but more realistic and informative composition from the 2nd to the 1st century BC is painted in red on a rock near Kavkazskoe village in the Minusinsk Basin in southern Siberia, Russia (Miklashevich/Solodeinikov 2013, 186; Monna et al. 2022, 95), which depicts a larger bird of prey with a leash hanging from its legs (**fig. 1c-d**). The direct meaning of the composition is not connected with hunting, since in front of the horse's muzzle there is a figure of a man with half-bent legs and raised arms. This can be interpreted as a scene of a horseman subduing a man on foot, where the presence of the bird emphasizes the high social status and power of the man on horseback.

Both compositions are reliable records of the use of hunting birds among herders in the eastern part of the steppe belt at the end of the 1st millennium BC. By the end of the 1st century AD, hunting with trained birds of prey had been transmitted from the steppe to China as an elite pastime, and the first narrative depictions of actual hunting scenes appeared there in Eastern Han (AD 25–220) tomb reliefs; they are supplemented by the first references to this type of hunting in Chinese written sources (Wallace 2018).

Evidence from the late 1st millennium BC, however, does not exclude the emergence of falconry, the possibility of the initial use of other devices to con-

1 I am grateful to Pan Ling and Huan Limin for their consultation regarding the Xichagou collection and for providing photographs of several belt plaques.

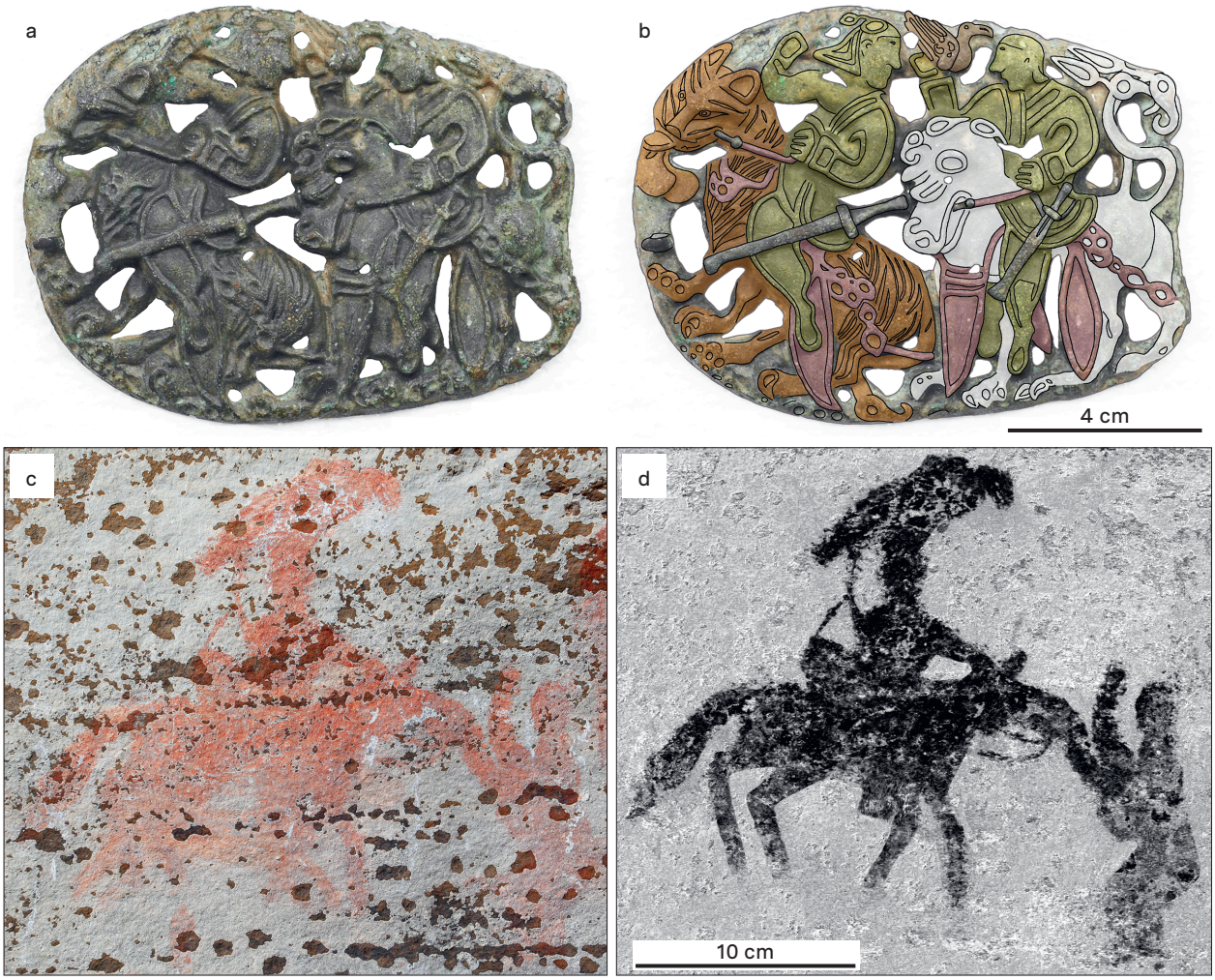

Fig. 1 Images of riders with raptors on their right fists, 2nd–1st century BC. **a** bronze belt plaque from Xichagou, Xifeng, Liaoning. – **b** results of tracing and identification of its visual elements. – **c-d** rock painting from Kavkazskoe, Minusinsk Basin, Siberia. – (a after Pan et al. 2020; b graphics Y. Esin; c–d photo and visualization [ERA software] Y. Esin).

trol a bird, a different method of hunting, nor other forms of expression of this practice in steppe art at an earlier time.

A recent study of earlier depictions of birds of prey in the art of pastoralists east of the Altai has led to the hypothesis that falconry emerged in the Late Bronze Age (Sodnomjamts/Batbold 2024). This conclusion, however, was not a result of an analysis of the images themselves, but was based on the assumption that the reason for the depiction of birds of no food value could have been the beginning of their use for hunting. The given separate images of birds at the same time allow for an interpretation that is not related to falconry; moreover, the first images of birds of prey appeared in the archaeological materials of Asian herders long before the Late Bronze Age.

One more hypothesis dates the emergence of falconry to the 3rd millennium BC (Erdenebat 2018, 590; Töpfer et al. 2023, 150; Gersmann/Grimm 2024). This was based on one rock art composition at the Tsagaan Salaa site in the Mongolian Altai, which depicts an archer riding a camel accompanied by a flying falcon (Erdenebat 2018, fig. 2). Its interpretation as a falconry-related scene is possible, although less convincing than an image of the bird on the arm. The dating of this scene to the Early Bronze Age, however, does not take into account the stylistic features of the carvings, the historical period in which images of camel riders first appeared in Sayan-Altai, nor the chronological sequence of these carvings alongside other petroglyphs on the same stone[2]. Considering these factors, the estimated time when the Tsagaan

2 I am grateful to Umirbyek Bikhumar, Head of the Mongolian Altai Rock Art Complex Protection Administration, Bayan-Ulgii, Mongolia, for the opportunity to study the petroglyphs on this stone in detail.

Salaa composition with a bird was pecked is the end of the 1st millennium BC. So, it turns out that images associated with the Early Bronze Age have not yet been studied in the context of the problems surrounding the history of falconry. At the same time, they represent a large series and very much deserve special attention. I have had an opportunity to document a significant portion of them by myself using photography, rubbing on thin paper, and 3D modelling.

Thus, the purpose of this article is an analysis of the oldest images of birds with characteristic diurnal predator features (primarily a large curved beak, claws, etc.) in the herder cultures of the steppe, forest-steppe, and arid zones of Asia and to study their chronology, geographical distribution, iconography and stylistics, contexts of their use and the possible evidence of taming and use for hunting.

Geography, Chronology, and Archaeological Context of the Oldest Bird of Prey Images

The steppe belt as it appears today was formed in Asia about nine to eight thousand years ago, after the climatic changes of the early Holocene. Its inhabitants in the Neolithic-Eneolithic era were few in number and mainly practiced hunting and fishing along the shores of lakes and rivers, where their settlements could be found. Among the known images of birds that decorate the ceramic vessels and are represented in the portable art of such communities are waterfowl species (Matyushchenko 1963, fig. 2, 7; Leont'ev 2003, 44–45 fig. 5, 6; Kalieva 2013, fig. 2, 6; Kiryushin 2019, 107 fig. 2, 9). A more complex development of this ecological zone began in the 4th millennium BC with the spread of livestock farming here. By the end of this millennium, groups of pastoralists, originally associated with the Yamnaya culture area, reached the Sayan-Altai and even the Khangai Mountains in the east. Their barrows and settlements are classified as the Afanas'ev archaeological culture (late 4th to early 3rd millennium BC). These people could be connected with one of the oldest rock art traditions here (Molodin 1996; Esin 2010b). Among its characteristic images are large birds in side view with folded wings, long necks and legs, which can be identified as cranes, since the most detailed figures at the Khurugiin Uzuur site in Khangai have indicative long feathers at the back of the head (Esin et al. 2012, 208). One image of a bird of prey from Aral-Tolgoi in the Mongolian Altai (**fig. 2**), shown in side view with folded wings, without legs, but with two egg-shaped ovals inside the body contour (**fig. 3l**), possibly belongs to this tradition (Kubarev 2002). The chronology of such petroglyphs, however, remains controversial: some researchers allow their dating to the late Palaeolithic and interpret the birds with long legs and necks as ostriches (Tseveendorj 2005, 74–76; Jacobson-Tepfer et al. 2010, fig. 2, 3; Zabelin 2010, fig. 4; Molodin 2024, 196).

The first reliable indications of a special attitude towards birds of prey appear in herder cultures from the middle of the 3rd to the early 2nd millennium BC. They are represented in the petroglyphs and portable art of several archaeological cultures in two different regions at the same time: 1) in the lands between the rivers Amu Darya and Ili in the territories of Uzbekistan and Kazakhstan; 2) in the Sayan-Altai Mountains and their northern foothills in between the Irtysh and Yenisei rivers in the area of present-day Mongolia and Russia (**fig. 2**).

The first, western region, includes steppes, semi-deserts and deserts, with the most interesting sites located in the Bukantau Mountains (50–60 km to the north of Uchquduq city, Navoi Region, Uzbekistan). Here, on the rocks near springs, wells, and copper deposits, the carved images of large birds of prey were found (Os'kin 1976; Rozwadowski 2004, fig. 70). The birds are depicted in side view with folded wings. More schematic profile images at the Akkainar and Kulzhabasy sites (Almaty region, Kazakhstan) probably belong to a similar time period (Zheleznyakov 2019, fig. 4, 6), though it has not yet been determined what culture they can be attributed to, due to the poor knowledge of the Bronze Age before the spread of the Andronovo culture.

The second, eastern region, is characterized by mountain-steppe and forest-steppe landscapes, where there are images of birds of prey engraved and pecked on rocks, stelae, and slabs, and also stone and bone figures of birds that were once attached to clothes. Most of the images were found as a result of the excavation of burials and settlements that allow us to date the images reliably to the Early Bronze Age. They belong to different archaeological cultures:

- the Khemtseg (Chemurchek) culture (2600–1800 BC) in the territory of north-west Mongolia and neighbouring lands: Khar Chuluut 1 burial

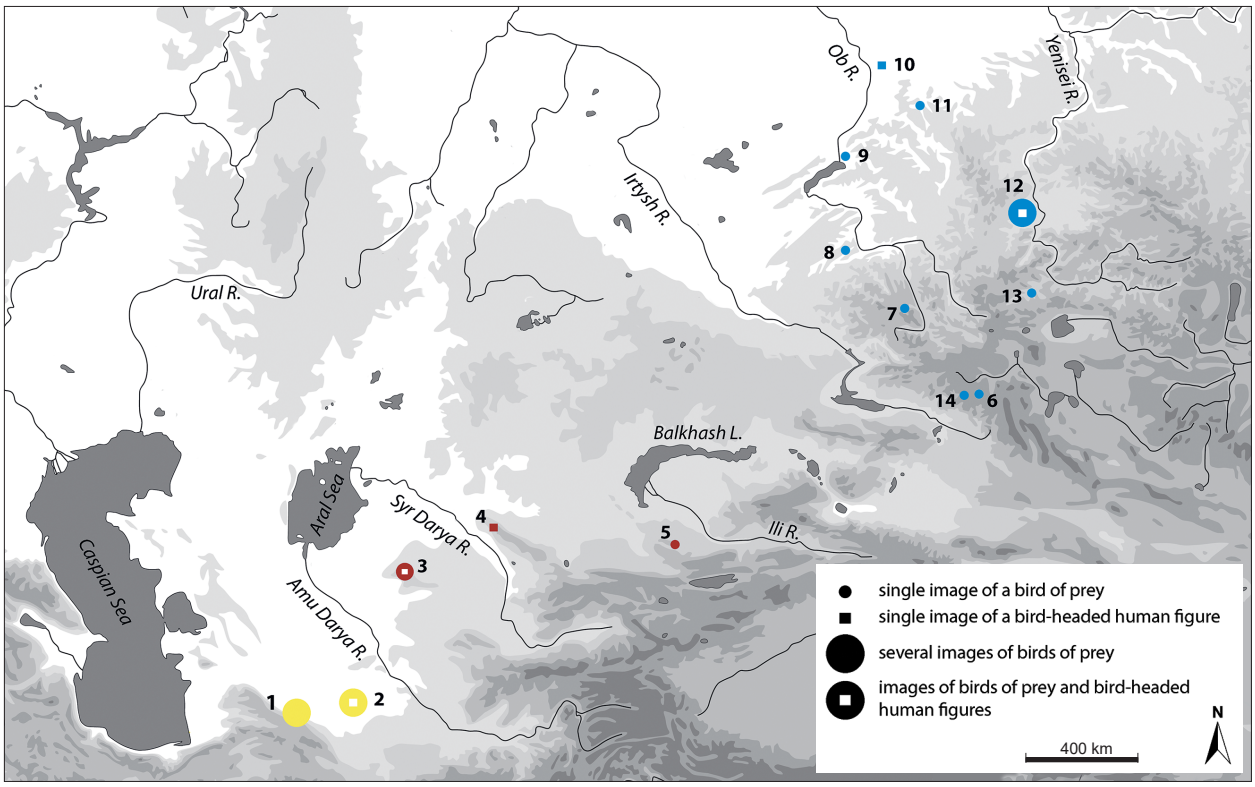

Fig. 2 Location of the main sites with images of birds of prey along the Asian steppe and arid zones in the late 4th to early 2nd millennium BC. **1** Kara Depe. – **2** Gonur. – **3** Kyrbukan. – **4** Karasuyir. – **5** Akkainar. – **6** Khar Chuluut I. – **7** Karakol. – **8** Berezovaya Luka. – **9** Turist-2. – **10** Samus IV. – **11** Lake Utinka. – **12** Tas Khazaa, Beltyry, Itkol II, Lake Belyo, Shalabolino. – **13** Bizhiktig Khaya. – **14** Aral-Tolgoi. – Sites of the agricultural communities of western central Asia are indicated in yellow, sites of the western group of herders indicated in red, sites of the eastern group of herders in blue. – (Map Y. Esin).

and ritual site, A. Kovalev and Ch. Munkhbayar's excavation, 2015,

- the Karakol culture (c. mid-3rd to early 2nd millennium BC) in the Russian part of the Altai mountains: Karakol cemetery, V. D. Kubarev's excavation, 1985–1986,
- the Elunino culture (c. 2500–1800 BC) in the territory of eastern Kazakhstan and the Altai Region of Russia: Beryozovaya Luka settlement, Yu. F. Kiryushin, A. A. Tishkin, S. P. Grushin's excavation, 1999–2003,
- the Samus and Krokhalyovka cultures (c. late 3rd to early 2nd millennium BC) in western Siberia: Lake Utinka grave, stray find, 2004; Samus IV settlement, V. I. Matyuschenko's excavation, 1974; cemetery at the Tourist-2 settlement, N. V. Basova's excavation, 2017,
- the Okunev culture (c. 2600–1700 BC) in the Minusinsk Basin on the Yenisei river: Bel'tyry, Ust'-Es and Tas Khazaa cemeteries, A. N. Lipskiy's excavation in the 1950s; Itkol II cemetery, A. V. Polyakov's excavation, 2017; stone stelae from the villages of Bel'tyry and Kyzlas and from Lake Belyo; Shalabolino rock art site,
- the Bronze age culture in Tuva: Bizhiktig Khaya rock art site.

Further east, there is one stylistically comparable image of a bird of prey in a side view with folded wings among the petroglyphs of Zhongwei 中卫 in Ningxia, north-western China (Zhou 1991, fig. 92; Cheremisin 2022, 796). In terms of landscape, this distant find is comparable to some of the sites discussed above. However, its age and archaeological context require special study.

Forms of Representation

Images of birds with characteristic predatory features on a flat surface can in both regions be divided into several types and subtypes depending on the completeness of the figure, the chosen projection of the body and the position of the wings.

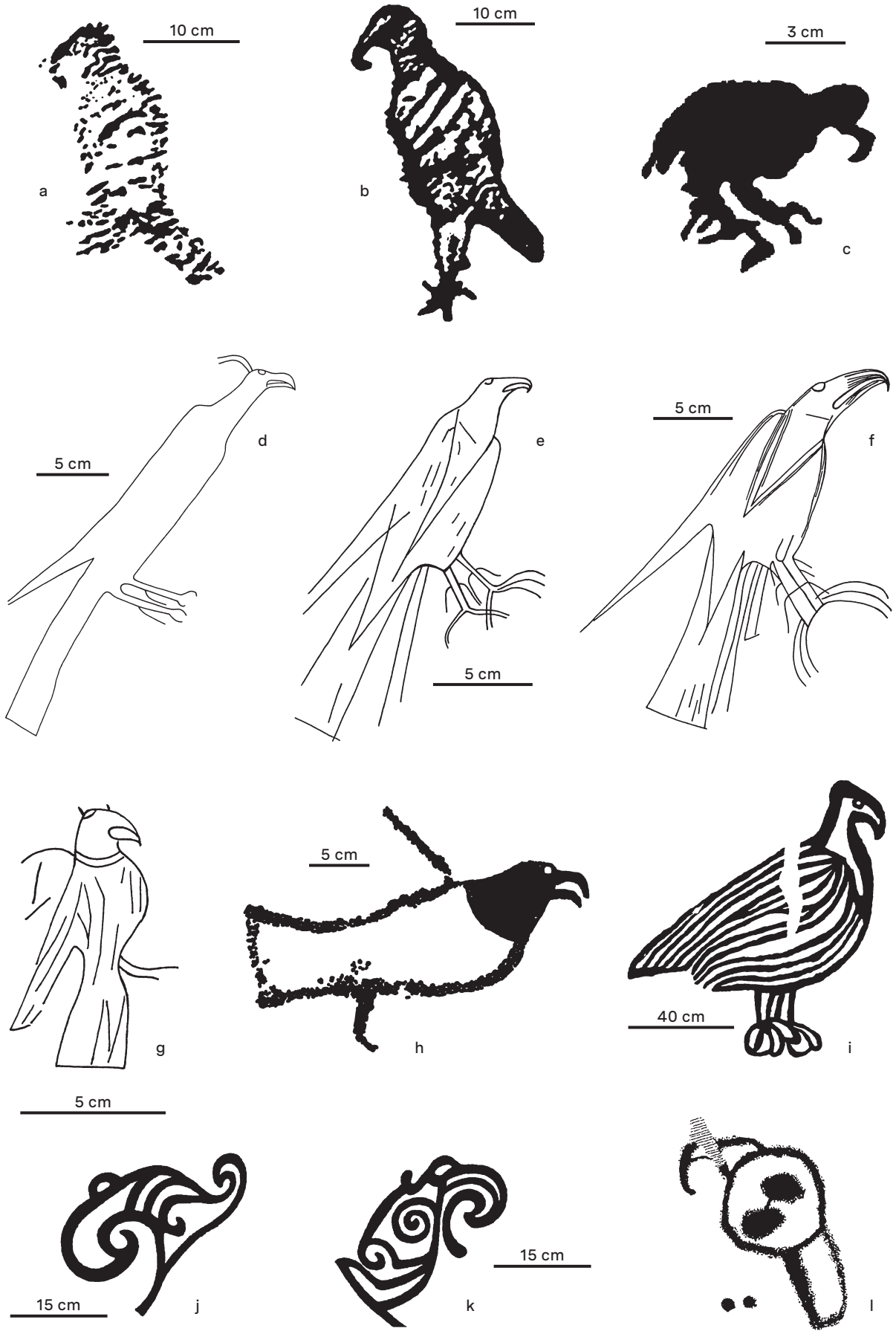

Fig. 3 Images of birds in side view. Uzbekistan: **a–b** Kyrbukan. – Southern Kazakhstan: **c** Akkainar. – Minusinsk Basin: **d–g** Tas Khazaa, grave 5 and 1; **h** Kyzlas; **j–k** Lake Belyo. – Tuva: **i** Bizhiktig Khaya. – Mongolia: **l** Aral-Tolgoi. – (a–b after Rozwadovski 2003, fig. 70; c after Hermann 2016, fig. 7A; d–h tracing and graphics Y. Esin; j–k after Leont'ev et al. 2006, stela 140; i after Devlet/Devlet 2005, fig. 64; l after Kubarev 2002, fig. 1, 7). – l not to scale.

Type 1. Bird in Side Projection

Subtype 1A combines figures with folded wings. These were depicted on the stelae and slabs of Tas Khazaa barrow (Lipskii/Vadetskaya 2006b, table XIX, 3), on a slab from the village of Ust'-Es (Leont'ev et al. 2006, fig. 238), on the stela from Lake Belyo, and at Bukantau, Akkainar, and Bizhiktig Khaya (one very large image, probably life-size) (**fig. 3a-g. i. k**). The tips of the wings may be pressed against the tail or slightly raised above it. This subtype may also include a miniature and very schematic flat image of a bird made of bronze (Matyushchenko/Sinitsyna 1988, fig. 7, 5), found in grave 2 at Rostovka cemetery (late 3rd to early 2nd millennium BC), which in recent years has come to be associated with the Krotovo culture.

Regarding the position of the wings, two miniature sculptures (both carved from brown stones) are related to this group: one was found at the Elunino culture's Berezovaya Luka settlement (**fig. 4a**) and was possibly attached to the side of a headdress (Kiryushin et al. 2010); the other (**fig. 4b**) was part of a necklace from a Samus culture burial at Lake Utinka (Bobrov/German 2007; Bobrov et al. 2010).

Subtype 1B includes images in side projection with their wings raised upwards (in the currently known cases only one wing is shown; **fig. 3h. j**). The same birds are distinguished by the display of only one leg without details, although two legs are typical for the other type 1 images (in most cases with claws). In possibly only one case of subtype 1A, the bird is depicted with one leg (**fig. 3g**).

Type 2. Bird in Front-and-Bottom Projection with Spread Wings, Shown Symmetrically on Each Side

Subtype 2A is represented by a bird on a slab from the Khemtseg culture site of Khar Chuluut 1 (Kovalev/Munkhbayar 2015, 165), in which the ends of the wings are extended towards the head (**fig. 5a**).

Subtype 2B is distinguished by wings extended towards the tail, shown on the slab in the Itkol II cemetery and on the stela from the Okunev barrow at Tas Khazaa as well as on the Karakol stela (**fig. 5c-e**). It is also represented by two flat figures made of white stone from the Okunev burial in Bel'tyry cemetery, barrow 6 (**fig. 5b**), which were sewn onto the chest of a woman's costume (Lipskii/Vadetskaya 2006a, 75). A flat and single-sided bone figure of a bird with a broken off beak from a male burial (grave 6) in the Krokhalyovka culture's Turist-2 settlement also belongs to this subtype (**fig. 5f**). It appears that it was also sewn onto the deceased's costume in the center of the chest (Basova et al. 2019, 57).

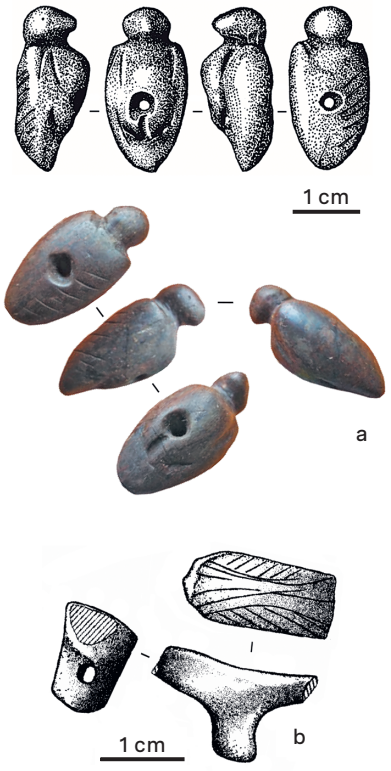

Fig. 4 Stone sculptures of birds. **a** Berezovaya Luka settlement, Elunino culture. – **b** Lake Utinka grave, Samus culture. – (a after Kiryushin et al. 2010, with graphical modification by Y. Esin; b after Bobrov/German 2007, with graphical modification by Y. Esin).

Among the less significant differences within type 2, it is necessary to note two ways of depicting the head: a) in a bottom projection (**fig. 5b**), and b) in a side projection (**fig. 5a. c-f**). There are also differences in how the legs are depicted: they are either a) not shown, i. e. they are assumed to be pressed to the body (**fig. 5b. d. f**), b) positioned on both sides of the body (**fig. 5a**), or c) located on one side of the body, i. e. in a side projection (**fig. 5c. e**).

Type 3. The Bird's Head

These are mainly individual images shown in profile on a flat surface (**fig. 6**), but there is also one sculptural image above a man's head at the top of a stone stela from the neighbourhood of Bel'tyry village (**fig. 7**). In the latter case, the bird's head is perceived as part of a special headdress. In addition, in Okunev (see below) and Samus art (**fig. 8**), on the petroglyphs of the Karatau (**fig. 9b**) and Bukantau Mountains (?) (**fig. 10a**), the bird's head was used as a component part of male figures. However, this type of image goes beyond the image of a bird.

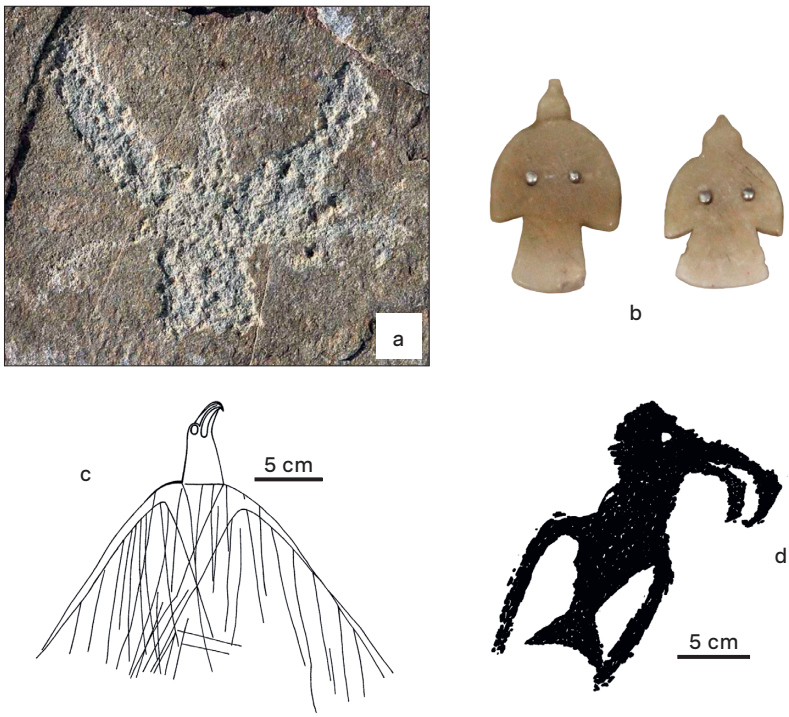

Fig. 5 Images of birds in front view with spread wings. **a** Khar Chuluut I, Mongolian Altai. – **b** Bel'tyry, barrow 6, Minusinsk Basin, collection of the Khakass National Museum (iron pins are modern). – **c** Tas Khazaa, Minusinsk Basin. – **d** Itkol II, barrow 1, Minusinsk Basin. – **e** Karakol, barrow 2, grave 2, Russian Altai. – **f** Turist-2, grave 6, Novosibirsk. – (a after Kovalev/Munkhbayar 2015, fig. 52; b–d tracing and photos Y. Esin; e after Kubarev 2009: fig. 62; f after Basova et al. 2019, fig. 6). – a–b. e not to scale.

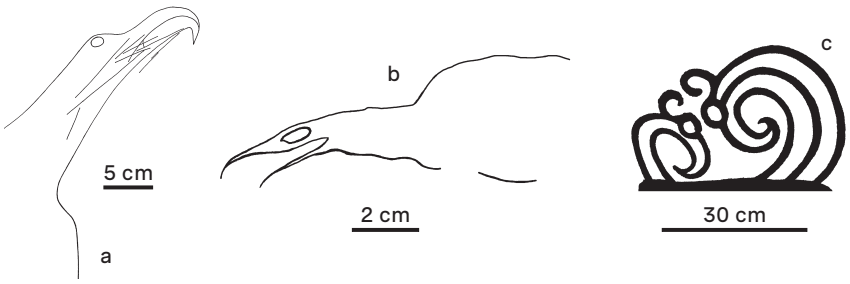

Fig. 6 Images of birds' heads (sometimes with the front part of the body) from the Minusinsk Basin. – **a** Tas Khazaa, grave 5. – **b** Shalabolino. – **c** Lake Belyo. – (a–b tracing and graphics Y. Esin; c after Leont'ev et al. 2006, stela 140).

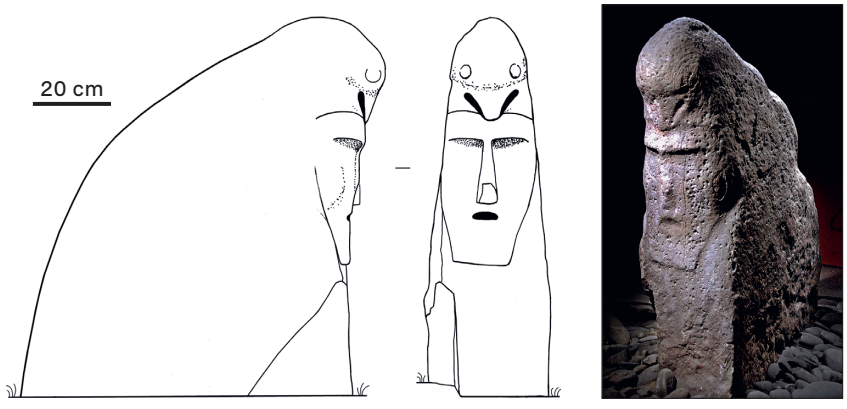

Fig. 7 Stone stela from Bel'tyry, Minusinsk Basin, curated by the Khakass National Museum. – (Drawing Y. Esin; photo after Esin 2010).

Fig. 8 Reconstruction of the composition on the upper part of a ceramic vessel of the Samus culture, Samus IV settlement, collection of the Museum of Siberian Archaeology and Ethnography of Tomsk State University. – (Photo, tracing and graphics Y. Esin).

Fig. 9 Male figures with (**a**) human and (**b**) eagle heads from Karasuyir, Karatau Mountains. – (Tracing and graphics Y. Esin, after Murgabaev/Maldybekova 2021, fig. 3).

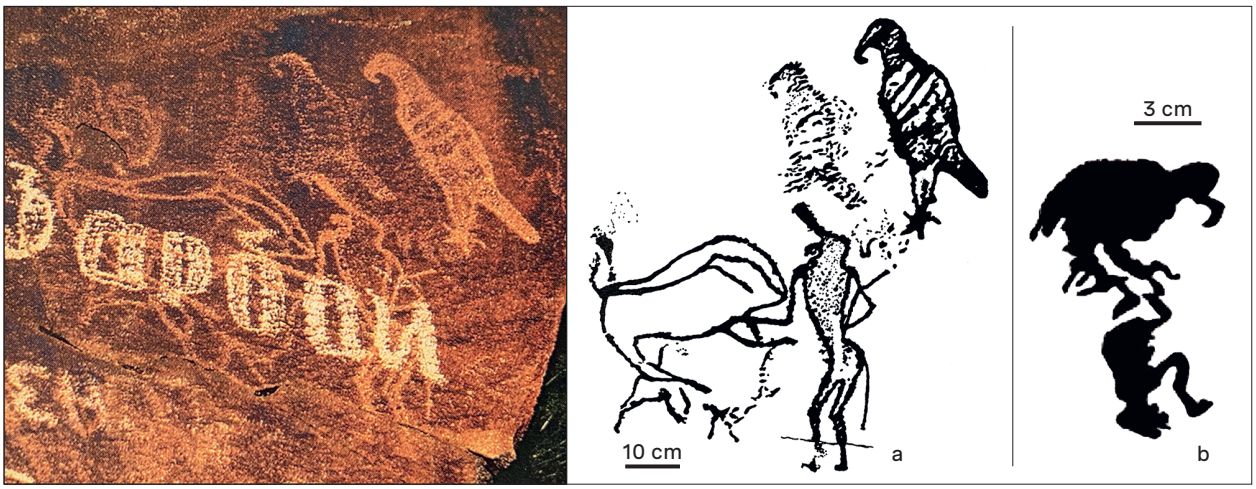

Fig. 10 Birds and possibly a bird-headed male figure in petroglyphs. **a** Kyrbukan, Bukantau Mountains. – **b** Akkainar. – (a after Rozwadovski 2003, photo 29 fig. 70; b after Hermann 2016, fig. 7A).

Discussion of Types

In general, among the currently known images of birds, those with folded wings in a side view predominate. Lesser in number are birds with two spread wings in a projection from below and with the head shown in profile. Individual images of the head are the rarest. A common technique used to depict birds of different types, archaeological cultures and territories, is the display of large feathers (primarily on the wings and tail) using parallel lines (**figs 3a-b. g. i; 4; 5c. e-f**). There is also a similarity in the horizontal line on the necks of the Okunev and Krokhalevka birds (**figs 3g. j; 5c. f**). The head is separated from the body in a different way in two more birds from the Minusinsk Basin and Tuva (**fig. 3h-i**).

The largest series of images, which includes the most types and subtypes, is found in the Okunev culture of the Minusinsk Basin. The early group of images found here are depicted on petroglyphs from Tas-Khazaa, Bel'tyry, Ust'-Es, Shalabolino (**figs 3d-g; 5b-c; 6a-b**), and the late group is represented by the images from barrow 1 in the Itkol II cemetery and on the stela near the village of Kyzlas (**figs 3h; 5d**). The early images are the most realistic and detailed, while the later ones are more schematic. The birds on the stela from near Lake Belyo (**figs 3j-k; 6c**) look somewhat separate from both groups. They are distinguished by the circle of the eye shifted beyond the outer contour of the head, a spiral line behind the eye, a spirally twisted end of the wing, and a spiral on the body. All these features are close to the art of the Early Iron Age herders, commonly named the »Scytho-Siberian animal style«. However, signs of a later addition of these images to the Early Bronze Age stela have not been identified. It is clear that these should be assessed as evidence of the early formation of some stylistic features that became widespread later.

Problems of Species Identification

Archaeologists, biologists and ornithologists have already proposed taxonomic identifications for some of the bird images considered here (Potapov 1957, 430; Kubarev/Zabelin 2006; Basova et al. 2019, 57; Pankina/Ermakov 2020). To discuss the same question, I also consulted with several ornithologists from Siberia and Kyrgyzstan[3]. However, the conclusions of the specialists often differ greatly. For example, the bird from Bizhiktig Khaya (**fig. 3i**) has been identified as a golden eagle (*Aquila chrysaetos*), a black vulture (*Aegypius monachus*), and a snowcock, the bird from Har Chuluut 1 (**fig. 5a**) as a bird of prey, a swan or a cormorant, the bird on the stela from the village of Kyzlas (**fig. 3h**) has been identified as an eagle and a seagull, one of the Tas Khazaa burial mound birds (**fig. 3g**) has been interpreted as a bird of prey, a cuckoo, or a horned lark, and one ornithologist has identified the beak of the bird on the slab from the Itkol II cemetery (**fig. 5d**) as that of a flamingo, etc. This problem deserves a special comment.

The identification of images with real bird species is indeed a difficult task, since even the most »realistic« of them are not an exact reproduction of the prototype: the shape and size of some parts of the bird can be greatly distorted under the influence of the iconographic and stylistic conventions that had developed in a particular culture for this type of image, as well as the individual preferences and talents of specific »artists«, and the chosen material and technique. Most often, significant distortions affect the beak (**figs 3j-k; 5d**) and feet (**fig. 3c. e-f**), but they can also affect the wings (**figs 3h. j; 5d**), and the general shape of the body (**fig. 3d**). Some features of the images may not be connected at all with the biological features of birds of prey – for example, the triangles on the chest of some figures (**fig. 3e-f**) are related to the mythological nature of these beings. Without taking into account this specificity of ancient art, determining the taxonomic affiliation of the depicted birds opens up possibilities for identifying a wide variety of species and even orders based on the same images, depending on which element of them is considered most important by a particular specialist. Rock art researchers also do not always take this into account sufficiently, sometimes creating long lists of identified bird species (Chigaeva 2007, 10–13). In traditional art, however, the set of objects was limited and was reproduced many times within each culture (with the inevitable variations noted above within the established iconography and style) due to the repetition of situations in which the corresponding images were in demand (Esin 2009b, 50).

3 I would like to thank ornithologists Tamara Zlotnikova (Abakan, southern Siberia) and Erik Shukurov (Bishkek, Kyrgyzstan) for consultations on the possible taxonomic affiliation of the bird images.

Taking into account the specificity of ancient art, all the images of birds presented here can be identified in the most general sense as diurnal predators of the Accipitridae (most of the images) and Falconidae (perhaps some of the images) families.

Analysis of Contexts

The contexts in which bird of prey images are found can be divided into four types:

1) A bird of prey is adjacent to an image that can be interpreted as its prey. One such case is the image on the slab from the Itkol II cemetery, which seems to depict a scene of a bird of prey hunting a waterfowl. The bird's wings are spread out, pointed towards the tail and pressed against the body, as if the bird were attacking prey (**fig. 11**). The second case can be seen on the rocks of Akkainar, where a type 1A bird is shown above the figure of a dead man on his side (his head is directed downwards, and his arms and legs are bent; **fig. 10b**). These compositions allow for both a realistic and a ritual-mythological interpretation.

2) A bird of prey is combined with the image of an anthropomorphic mythological character, where the bird is a character of lower status, with the function of an assistant. In particular, on one stela from Tas Khazaa, two birds of type 1 accompany the two anthropomorphic beings wearing pointed headdresses, which may be interpreted as deities (**fig. 12a-d**). Rays protrude from the chief deity's head and body, and lines, resembling lightning, are drawn down from the outstretched arm. The rays on the figure's back resemble feathers and form a bird's tail at the bottom, but this bird-like feature is depicted not as a natural part of the character, but as part of his clothing. The next character has a bird's tail as well. Arms are absent: they are instead possibly represented by wings folded behind the back (Esin 2009a, 91 fig. 3). In this context, the birds of prey appear as images associated with the heavenly world of the deities, playing the role of assistants to the latter. At the same time, they themselves may be deities, since some attributes of the anthropomorphic and ornithomorphic figures match, such as wings and tails on the figures and triangles on the chests of both human characters and birds. It appears that the type 2 bird (**fig. 12e**) was added to this stela a little later, since it is engraved on top of the described composition.

On another stela from Tas Khazaa, a bird of prey accompanies a figure with a human body (covered with feathers, judging by the parallel lines on it) and the head of a bird of prey (**fig. 13c-d**). The bird is carved above his left arm. Although it does not touch the arm, it is depicted in a perched pose and was probably intended to be perched on the outstretched arm of the bird-headed figure. What is also noteworthy is the difference in the depiction of both arms: the right arm ends in a bird's claw, and the left one looks as if it is wrapped in something that protects it from the claws of a perched bird. The double line on the bird's neck (**fig. 13d**) is also curious. Although various ways of separating heads from bodies are one feature of Okunev art, widely represented primarily in animal images and associated with the practice of sacrifice (Esin/Polyakov 2025), the double line may be an image of a collar/neckband (see, for example, a similar collar on a horse's neck: Leont'ev et al. 2006, stela 181). In this case, it is then also a sign of a tamed bird. The protruding transverse line on the neck of the bird of prey from Tourist-2 may show a similar device (**fig. 5f**). The use of a bird of prey as an assistant and the carrying of it on the arm resembles the practice of modern hunters with raptors. The figure with this bird on the arm is the largest and the most powerful among the other figures on the stela. The two »rods« on his head resemble the two vertical lines on top of the face of the deity carved in the centre of the stela (**fig. 13a**). It is possible that these are the same character. The smaller bird-headed figure with a large number of rays and a bull's horn above the eye (**fig. 13e**) is holding out some kind of treat to him (a similar action, but in relation to the face in the center of the stela, is performed by another bird-headed figure with rays: **fig. 13b**). In the context of this composition, the presence of a bird of prey on the arm can be considered an additional sign of high social status.

The combination of a male figure and birds of prey at the Kyrbukan rock art site (**fig. 10a**) is comparable to compositions from the Tas Khazaa barrow (**figs 12-13**), although in this case it is less clear whether they were a single composition. One bird is carved directly above the head of the figure, and the other is slightly behind him. The latter, however, is equal in size to the male figure itself. This character is confronted by some sort of large animal.

3) In the third type of composition, a bird of prey is combined with the image of another predator. On the stela from Lake Belyo in particular, complete images of birds of prey and individual heads are included in the image of the lower jaw of the predator's open mouth (**fig. 14**). In the art of the Okunev culture, the image of this beast is one of the most important

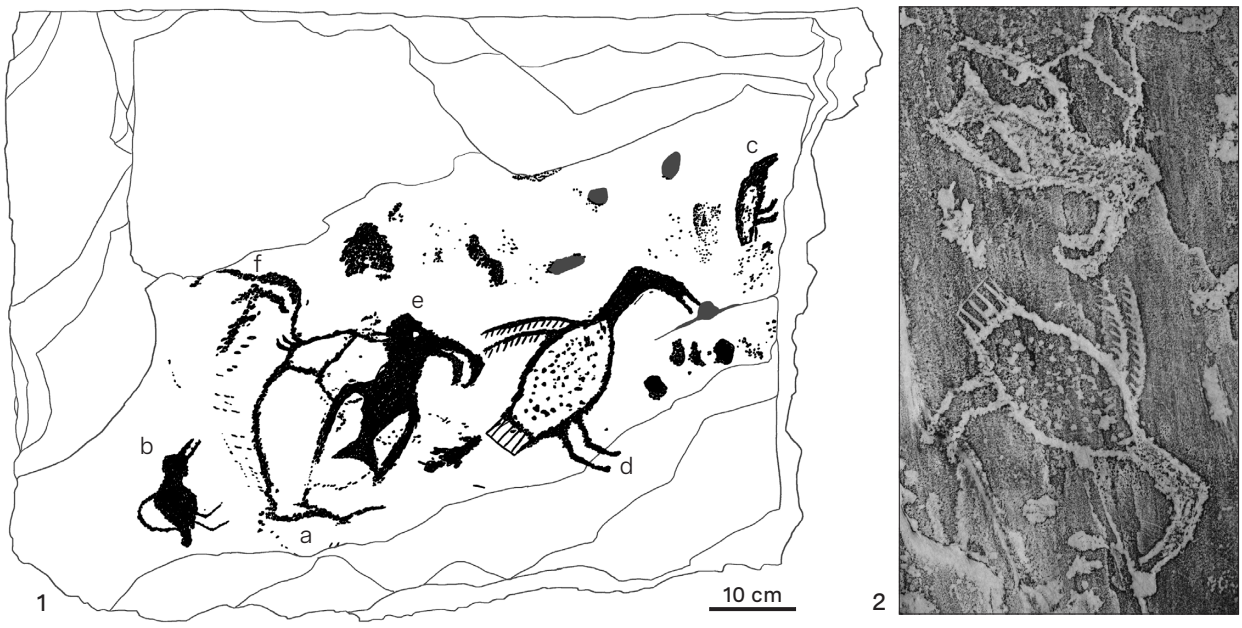

Fig. 11 A stone slab from Itkol II, barrow I, Minusinsk Basin (**1**) and a fragment of it with another possible orientation (**2**). – **a** Bull. – **b-c** Birds. – **d** Waterfowl. – **e** Bird of prey. – **f** Head of a bird of prey. – (Tracing, rubbing, graphics and photo Y. Esin).

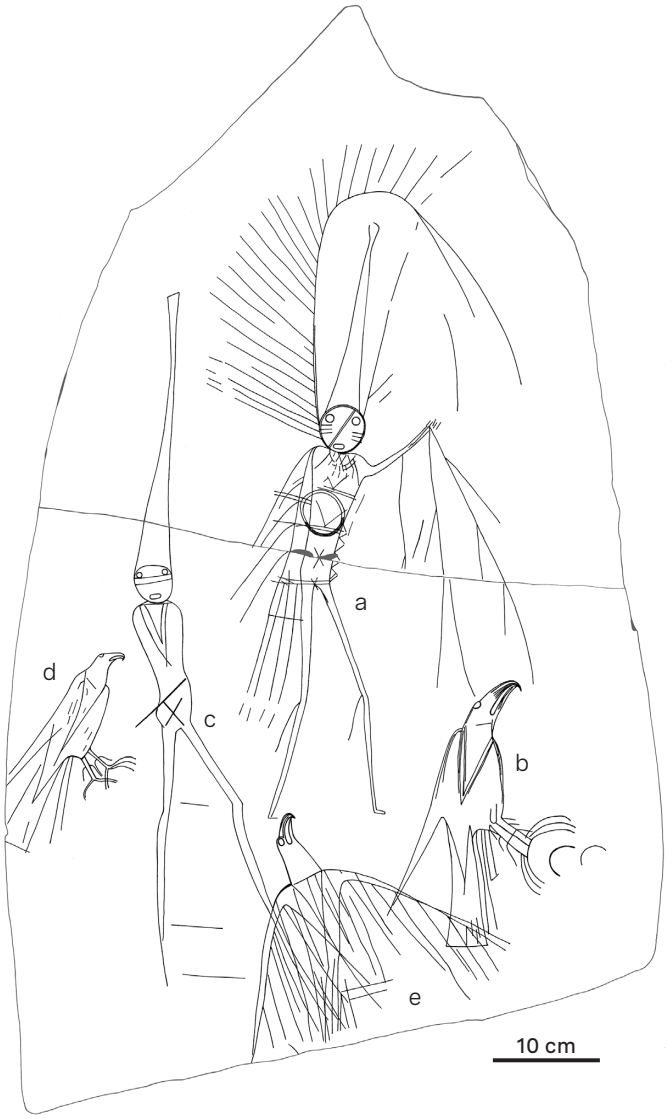

Fig. 12 Stone stela from Tas Khazaa barrow, grave I, Minusinsk Basin, collection of the Khakass National Museum. – (Tracing and graphics Y. Esin).

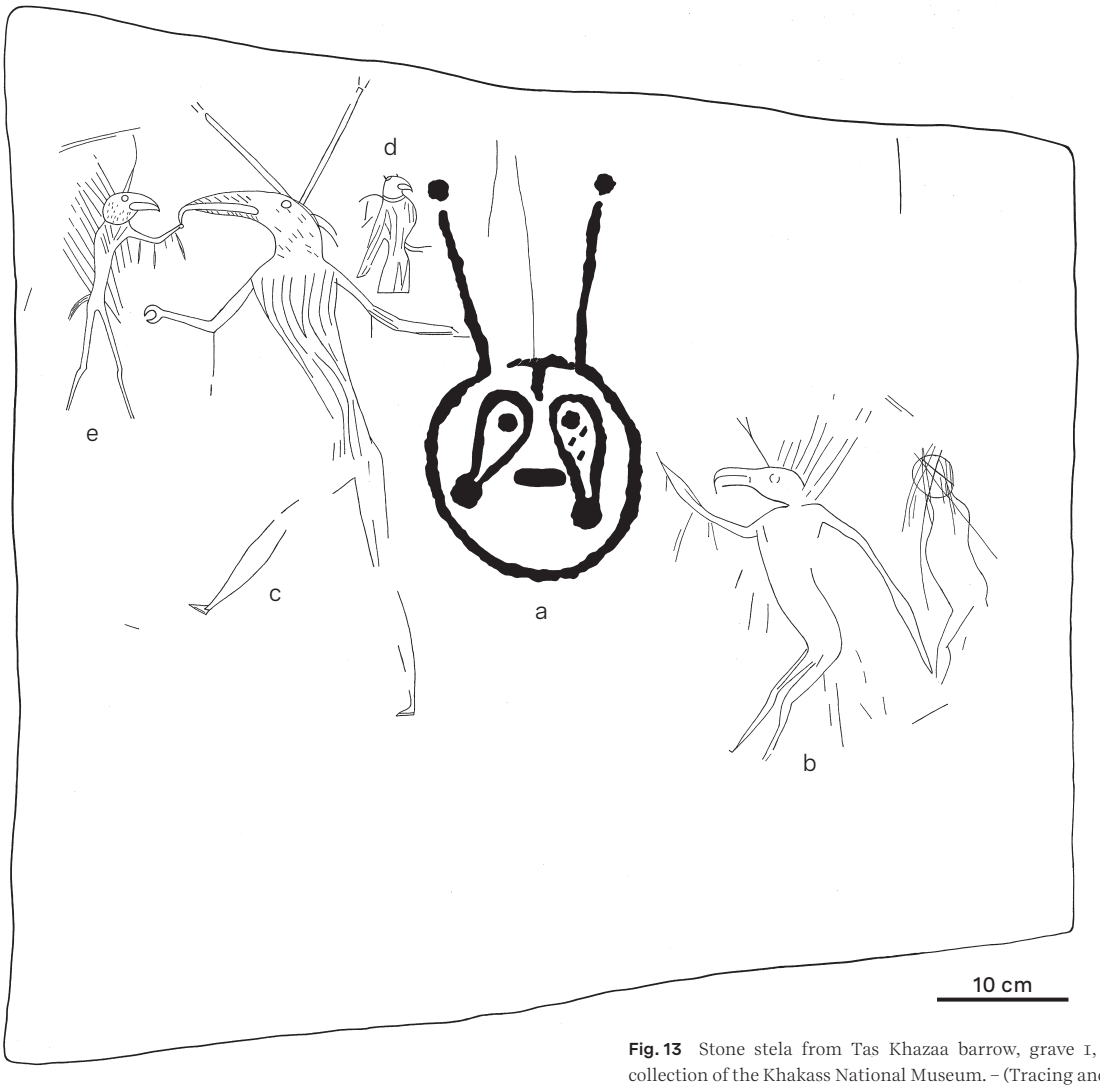

Fig. 13 Stone stela from Tas Khazaa barrow, grave 1, Minusinsk Basin, collection of the Khakass National Museum. – (Tracing and graphics Y. Esin).

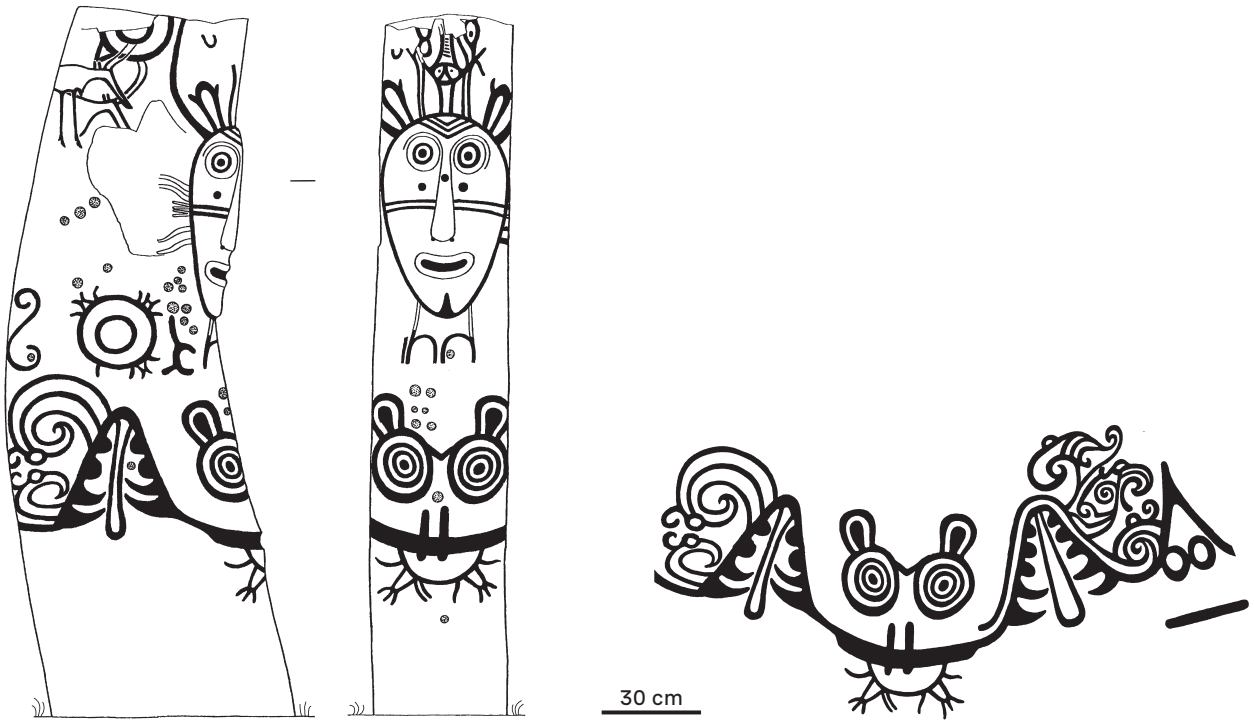

Fig. 14 Stone stela from Lake Belyo, Minusinsk Basin. – (After Leont'ev et al. 2006, stela 140, with graphical modifications by Y. Esin).

and complex: it combines the muzzle of a bear with parts of other animals: a bull, an elk, a snake, a bird of prey, etc. (Esin 2010a, 126–127. 129. 131). In depictions of the whole figure of this animal in profile, it is often endowed with the feet of a bird of prey. This character is associated in Okunev art with the ideas of the change of day and night and the maintenance of seasonality and cyclicity in the world (in the most realistic compositions, the beast is shown pursuing or swallowing a luminary or solar deity; Esin 2010a, 108. 130). Thus, the composition on the stela from Lake Belyo united two different types of predators: those associated with the lower world and those with the sky.

A certain parallel to the composition on the Okunev stela is the combination of figures of a bird of prey and a bear (Bobrov et al. 2010, fig. 1) on a necklace from a Samus culture's grave at Lake Utinka. The bird on this necklace, as well as the bird figurines sewn onto clothing (Bel'tyry cemetery, Turist-2), provided magical help and protection to the owners.

4) Another composition is a combination of a bird's head and a human head on a stela from Bel'tyry. This composition, which presents a special male headdress, could only be depicted if it existed in the real life of the herders. This required hunting for a bird of prey. The same headdress existed in parallel with another one, on which a crane's head was used (Polyakov/Esin 2015, 54; Esin 2015). The remains of cranes' heads, probably parts of such headdresses, have been found in some Okunev graves. The reason for placing the bird's head on a headdress is attributed to its role in the beliefs of the early herders. By wearing such a headdress, a man linked himself to the mythical bird-headed character that is represented in their art.

Discussion

There is a certain similarity in the forms used by different communities of early herders to depict birds of prey that cannot be explained solely by the similarity of their natural characteristics. This is also corroborated by the relative synchronicity of the spread of this image. Both aspects testify against its independent emergence under the influence of internal developments within each local community. They rather reflect the formation of an interaction network across a vast area of the steppe belt and the migration processes of groups of herders from west to east in the 3rd millennium BC that influenced all the above listed cultures in the eastern region.

For the question of the emergence of the discussed bird images and the related beliefs, sites from the western region are of special interest. These are located near ancient agricultural areas, where as early as the end of the 4th/the beginning of the 3rd millennium BC, images of a bird of prey (with spread wings and, possibly, with folded wings) appear in the decor on vessels in the Kara Depe settlement, Turkmenistan (**fig. 15a-c**) (Masson/Merpert 1982, tables XXI, 26. 29; XXIV). Among the compositions, there are combinations of birds with images of circles (probably the sun) and with ungulates (**fig. 15b-c**). In the second half of the 3rd millennium BC, the Bactria–Margiana Archaeological Complex (BMAC) or, alternatively, the Oxus civilisation, emerged in the same area, where the image of a bird of prey became even more important. BMAC seals and amulets depict birds with both folded and spread wings. The latter are particularly characteristic and include a subtype with the ends of the wings lifted up and two feet (**fig. 15f**), the specific iconography of which has many parallels in the art of western Asia. It is indicative that one image from Altai follows the same iconography (**fig. 5a**)[4]. Also on the BMAC seals (**fig. 15h. k-m**), there are depictions of eyes and wings in a style similar to those recorded on the stela from Lake Belyo (**figs 3j; 6c**).

The accuracy of falcon characteristics on the figurine from a royal burial in Gonur (**fig. 15i**) has given rise to the assumption that its inhabitants were already familiar with falconry (Sarianidi et al. 2020, 94). This argument by itself, however, does not seem sufficient for the conclusion drawn, since, for example, detailed depictions of a Horus Falcon in Ancient Egypt are not associated with falconry (Warburton 2018). At the same time, it should be noted that images on seals and amulets, as the main form of BMAC art known to us, have their own thematic and compositional limitations, and the size of the objects makes it difficult to distinguish small details.

The image of an anthropomorphic character with a predatory bird's head underwent parallel distribution in BMAC art. It is significant that the same

4 In addition to the similarity in iconography, it is worth noting the presence in the genetic profile of the Khemtseg culture individuals of a component related to the population of the BMAC, which reflects physical contact with the agricultural communities several generations earlier (Jeong et al. 2020, 893).

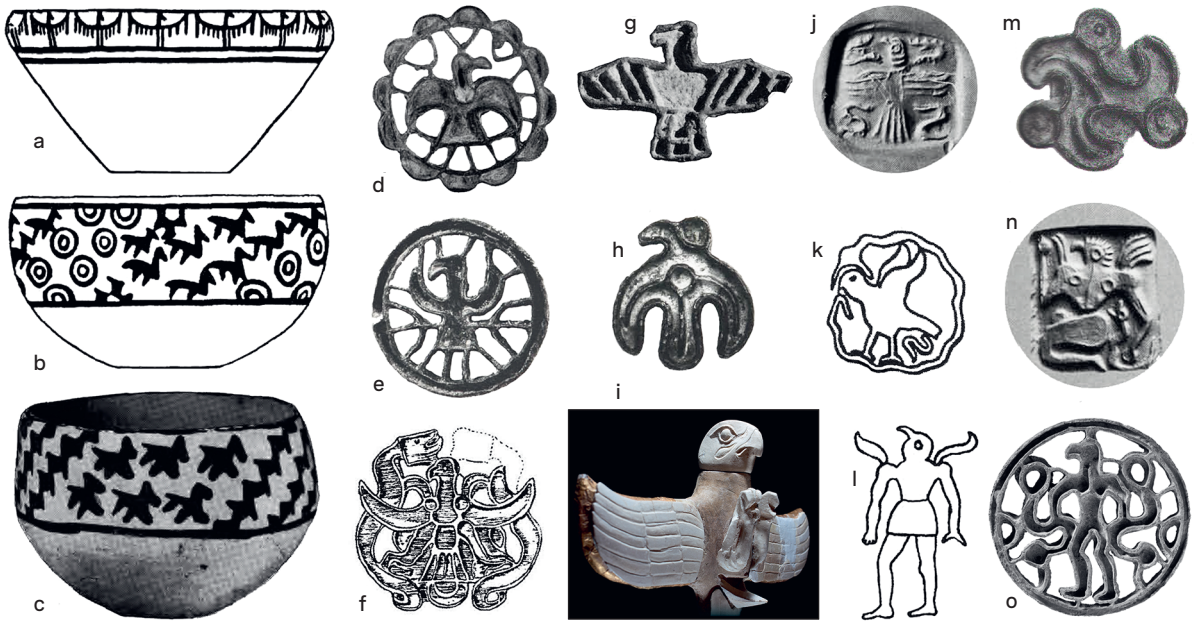

Fig. 15 Birds and bird-headed deities in the art of Bactria and Margiana in the late 4th to early 2nd millennium BC. **a–c** ceramic vessels from Kara Depe. – **d–h. j–o** seals and amulets from different places. – **i** falcon from the royal tomb 3200 in Gonur. – (a–c after Masson 1959; Masson/Sarianidi 1972; d–h. j–o after Sarianidi 1998; Winkelmann 2013; i after Sarianidi et al. 2020). – Not to scale.

character, which is deprived of a prototype in nature, is also represented by pastoralists. Possibly, one can consider the male wearing a headdress with a predatory bird head, as depicted on the stela from Bel'tyry (**fig. 7**), as a way of claiming the powers of such a mythological being. A similar intention may be the reason for the popularity of the eagle-headed deity in BMAC art: some of the male elite who commissioned the seals apparently chose this image as they associated themselves with this being. Notably, in all cases, the character's torso is shown *en face* and the head in profile, as is common in Near Eastern art. In addition, the bird-headed figure in the Karatau Mountains holds a round mirror with a handle, a typical element of BMAC material culture (**fig. 9b**). It is also no coincidence that the main character on one of the Tas Khazaa stelae has a slanted line on his face (**fig. 12a**), similar to a male character related to BMAC art (Francfort 1994, figs 3–5). The number of such parallels with BMAC art could be increased further. All this additionally testifies to relations between the herders of the steppe and the population on the northern periphery of the ancient agricultural area as early as the Early Bronze Age. These interactions undoubtedly had an impact on both groups of communities, but the general iconographic models for ornithomorphic images were probably developed in the cultural environment of the agricultural communities of western central Asia, where they are a bit older as well.

At the same time, of course, there are considerable differences due to the different preferences and beliefs of these population groups. For example, in the pastoralist art of this period, birds with folded wings are more common, whereas, in the art of the agricultural communities, birds with spread wings predominate. The subject of a struggle against snakes is most popular for compositions with eagles and eagle-headed deities on BMAC seals and amulets (Francfort 1994), whereas, among the herders, birds in comparable compositions are not found, although images of anthropomorphic deities with snakes have been discovered (Esin 2008, table V, 1. 2).

Details of some of the bird images allow for a comparison with traditional devices used in falconry. These include a pair of long curved lines behind the head and single lines above each foot in one of the Tas Khazaa bird depictions (**fig. 3d**): the first is reminiscent of the leather hood with strips that covers the head of a trained bird of prey; the second resembles the short leather straps that fasten each leg of a bird to a perch when necessary.

Paired long lines behind the head are also shown in the depiction of the eagle-headed character with a human body from the same barrow (**fig. 13c**), as well as behind the head of the male figure with the beak of a bird of prey in the Karatau Mountains (**fig. 9b**). The latter were previously compared to horns or long feathers (Murgabaev/Maldybekova 2021). The lines at the back of the head are also shown on the

birds on the Okunev stela from Lake Belyo (**fig. 14**), but they are single and more curved, providing a stronger argument for interpreting them as feathers. In this case, such feathers indicate some special qualities of the bird, and therefore the mythological nature of the image itself, similar to the triangle on the chest already discussed above. Lines behind the head of a raptor or bird-headed character are also found in 2nd-millennium-BC Hittite and Syro-Hittite glyptiques (Contenau 1922, figs 70. 142; Canby 1989, 113), where it is possible that they depict feathers or braids.

The lines on the legs of some bird depictions from Tas Khazaa are in pairs (**fig. 3e-f**). The simplest explanation for these is a comparison with the long feathers around an eagles' legs. At the same time, similar lines were depicted in the knee area of some anthropomorphic figures (**fig. 12a**; Leont'ev et al. 2006, stela 180), which, in the context of a man's costume, might rather show ties on trousers. Otherwise, this was one more way to assimilate anthropomorphic characters with birds of prey or vice versa.

The compositions in which birds of prey are first presented together with anthropomorphic figures are clearly mythological in nature. However, the reasons why they became part of these compositions in the role of assistants at that time are probably connected with changes in the society that increased the interest in such bird images. Of particular importance is the image of a perched bird near the outstretched arm of one figure (**fig. 16**). This composition can be interpreted as an image of a deity with a bird on his left arm. The nature of the relationship between anthropomorphic figures and birds most likely had a prototype in the real life of herders. This may indicate that herders had acquired experience in training birds of prey and interacting with them. Although the 3rd-millennium-BC visual compositions that are known today do not contain direct evidence of falconry, it is difficult to imagine that, in the artistic tradition of this early type, with its inherent set of themes and pragmatics, it could have been depicted in the narrative form we are accustomed to, even if it had already appeared.

The use of the left arm to carry the bird differs from the method recorded among Asian pastoralists at the end of the 1st millennium BC, who used the right arm for the same purpose (**fig. 1**). Nevertheless, a similar function of the left arm is found among depictions of both divine and human characters on foot in pre-Hittite and Hittite Anatolia and neighbouring lands (**fig. 17**; Görke/Kozal 2018, figs 5. 7. 10; see also Contenau 1922, seal 166). This, however, is not the only method registered there in the 2nd millennium BC since, parallel to it, there are also images

Fig. 16 Bird-headed deity with a raptor presumably perched on his left arm, Tas Khazaa, Minusinsk Basin. – (Tracing and graphics Y. Esin).

of birds perching on a right fist (Görke/Kozal 2018, figs 4. 6. 11. 13; see also Pittman/Aruz 1987, seal 57). If this is not the result of insufficient knowledge on the part of some of the Anatolian image makers then perhaps, at the initial stage of using tamed birds of prey, people preferred to use the left arm, but experimented with both.

The interpretation of these images from the Hittite lands, however, has been controversial in recent decades, whether they relate to hunting (Canby 1989, 116; 2002; Streck 2014–2016, 580; Cammarosano 2018, 69; van den Hout 2018, 117) or ritual activity (Reiter 2018a; 2018b; Osten-Sacken 2020, 301). The most balanced study, which has classified and compared all the available data in detail, has provided solid evidence that some of these images are indeed related to hunting (Görke/Kozal 2018). This raises the question of the relationship between the possible practice of falconry in Anatolia in the 2nd millennium BC (or at least the knowledge of the existence of such a method of using birds of prey) and evidence from the steppe belt. In this context, the BMAC, whose artistic tradition shows similarities with those of both the steppe and the Syro-Anatolian (Sarianidi 1994; 1998), appears to be a natural link between them.

Less clear possible early manifestations of taming birds of prey are also visible in south-eastern Iran in the second half of the 3rd millennium BC, where

Fig. 17 Two deities related to wildlife and the hunt with raptors (wearing collars/neckbands?) perched on their left fists worshiped by hunters after a successful hunt (**b**), depicted on a silver relief vase rhyton (**a**), Hittite Empire, central Anatolia, c. 14th–13th century BC. – (Photos courtesy of the Metropolitan Museum of Art, New York, #1989.281.10).

some images of birds of prey with a neckband-like detail were carved on relatively large chlorite objects used for various purposes (Warburton 2020, fig. 13; Perrot/Madjidzadeh 2003). These need to be studied thoroughly in the future. Stylistically, the images on these objects also have some parallels in the culture of the northern oases.

Conclusion

Summing up the results, we note that the period from the middle of the 3rd to the beginning of the 2nd millennium BC was the time of the emergence and widespread use of the bird of prey image in various herder communities in the territory between the Amu Darya river in the west and the Yenisei River in the east. Based on a comparative analysis of the available material, the similarity in iconography and stylistic features can be best explained as a result of complex local and interregional interaction across a large part of the Asian steppe, forest-steppe and arid zones and migrations of groups of herders along them from the west to the east. At the same time, the western images are close to the northern periphery of the ancient agricultural civilization, where, in the second half of the 3rd millennium BC, the BMAC formed, with a sharp increase in the number of images of predatory birds, the iconography of which is close to the herder ways of depicting the birds. In both cultural areas, in addition to images of birds themselves, the representation of an eagle-headed deity became widespread. This further strengthens the hypothesis of a connection between the ornithomorphic images of the herders and their southern agricultural neighbours.

Compositions in which a bird accompanies an anthropomorphic character, in one instance apparently perched on his arm, do not exclude the possibility that, as early as the middle of the 3rd millennium BC, Asian herders had experience with training predatory birds. The compositions themselves are not of a domestic nature, but mythological, and reflect the spread of beliefs associated with the special role of birds of prey in the life of man and nature. There is no indisputable evidence for the emergence of hunting with birds at this time among the visual materials or in the funeral rites of either the herders of the Asian steppe or the neighboring central Asian agricultural communities. If at this time the first practice of using birds for hunting appeared, which is only indirectly reflected in the archaeological sources available today, then it was foot falconry. This type of falconry is entirely consistent with the foot hunting method that was the only one available for the Early Bronze Age pastoralists. In this case, the use of a raptor replaced the hunter's bow and arrows. Another peculiarity is that the hunter carried his raptor on his left arm, rather than the right, as would become typical from the late 1st millennium BC. Visual compositions with raptors also show that

early falconry, in addition to its practical purposes, must have acquired ritual significance.

Early falconry equipment could include a collar/neckband, jesses and a leash for the bird's legs, and a cover for the hunter's arm. Obviously, the collar/neckband could not be an effective tool for controlling a bird, unlike livestock, dogs, etc. Rather, it had a symbolic meaning, as a sign of a trained bird, and subsequently fell out of use. At the same time, it is also comparable to the neckband used in some recent regional falconry traditions (Canby 2002, 164; Ali/Arshad 2010; Parikh 2020).

We should agree with the experienced falconer Karl-Heinz Gersmann's opinion that raptors for falconry at such an early historical stage were probably taken as young birds from the nest. It was only later that wild birds were caught. Goshawk, golden eagle, and saker falcon, which hunt on the ground, would have been the most suitable as the first game birds[5].

An early form of falconry, i. e. foot falconry, differs from the later horseback falconry known from present-day Turkic and Mongolian people. Although the first archaeological evidence of tamed horses appears in the art (for example, several depictions of horses with a collar, halter, and reins in the art of the Okunev culture, on the handle of a knife from grave 2 in the Rostovka cemetery, etc.) and ritual practice (the burial of a horse's head together with other livestock at one of the Okunev culture cemeteries: Nagler/Parzinger 2006, 107) of Asian steppe herders, alongside images of birds of prey, riding equipment (a saddle with a system of fastening straps and a reliable bridle) had not yet been developed at that time. This excludes the possibility of the origin of the modern form of falconry in the 3rd millennium BC. Its origin could not have occurred earlier than the beginning of the 1st millennium BC, when horseback riding became a common practice in the pastoral societies of the Asian steppe. The use of horses opened up new prospects for falconry, as it made it easier to transport the raptor to the desired location, making hunting more efficient, which could have contributed to its wider distribution. The onset of this historical period coincides with the appearance of bird of prey skeletons in barrows and some other types of archaeological sites of the herders mentioned in the introduction. The materials of this time and the problem of the early stage of the modern form of falconry among the nomads of Asia deserve special study.

As for the question of a single or multiple invention of falconry (Gersmann/Grimm 2024), the early archaeological materials considered here support the former. The authors of this invention apparently lived on the north-eastern periphery of the ancient agricultural communities of western Asia. The combination of the herders' environmental conditions and way of life created the ideal setting for the emergence and maintenance of hunting, driven by the practical necessity of obtaining meat and fur. Their mobility and various contacts both within the steppe and with sedentary communities must have contributed to the spread of the invention, but the form and role of falconry, due to many natural and cultural factors, did not remain constant in time and space.

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Bibliography

Ali/Arshad 2010: S. Ali / R. Arshad, Falconry in Pakistan: The Past and the Future. Internat. Journal Falconry, 2010, 51–56.

Basova et al. 2019: N. V. Basova / A. V. Postnov / A. L. Zaika / V. I. Molodin, Objects of Portable Art from a Bronze Age Cemetery at Tourist-2. Arch., Ethn. and Anthr. Eurasia 47(4), 2019, 53–65.

Bobrov/German 2007: V. V. Bobrov / P. V. German, Погребение сейминско-турбинского времени в Ачинско-Мариинской лесостепи. Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий. Ма-

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териалы итоговой сессии Института археологии и этнографии СО РАН 17, 2007, 178–183.

Bobrov et al. 2010: V. V. Bobrov / P. V. Volkov / P. V. German, The Utinka Burial. Arch., Ethn. and Anthr. Eurasia 38(4), 2010, 76–84.

Bunker et al. 1997: E. C. Bunker / T. S. Kawami / K. M. Linduff / E. Wu, Ancient bronzes of the Eastern Eurasian steppes from the Arthur M. Sackler collections (New York 1997).

Cammarosano 2018: M. Cammarosano, Hittite Local Cults (Atlanta 2018).

Canby 1989: J. V. Canby, Hittite Art. Biblical Arch. 52(2/3), 1989, 109–129.

2002: J. V. Canby, Falconry (Hawking) in Hittite Lands. Journal Near Eastern Stud. 61(3), 2002, 161–201.

Cheremisin 2022: D. V. Cheremisin, Птицы на скалах (еще раз об изображениях птиц в петроглифах Алтая). Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий. Материалы итоговой сессии Института археологии и этнографии СО РАН 28, 2022, 795–799.

Chigaeva 2007: V. Y. Chigaeva, Образы птиц в наскальном искусстве Северной Азии [Автореферат дисс. кандидата исторических наук / autoreferat diss. Kemerovo State Univ. 2007].

Contenau 1922: G. Contenau, La Glyptique syro-hittite (Paris 1922).

Devlet/Devlet 2005: E. G. Devlet / M. A. Devlet, Мифы в камне: Мир наскального искусства России (Moskva 2005).

Erdenebat 2018: U. Erdenebat, A contribution to the history of Mongolian falconry. In: Gersmann/Grimm 2018, 587–602.

Esin 2008: Y. N. Esin, »Солнцеголовые изображения« в раннеокуневском искусстве Минусинской котловины. In: D. G. Sabinov / O. S. Sovetova (eds), Тропою тысячелетий: К юбилею М.А. Дэвлет (Kemerovo 2008) 81–98.

2009a: Y. N. Esin, Stone stela bearing a »sun-headed« deity on the Tuim River, Khakassia (In commemoration of the Finnish Antiquarian Society Expedition to the Yenisei headed by J. R. Aspelin 120 years previously). Arch., Ethn. and Anthr. Eurasia 37(3), 2009, 85–94.

2009b: Y. N. Esin, Древнее искусство Сибири: самусьская культура (Tomsk 2009).

2010a: Y. N. Esin, Тайна богов древней степи (Abakan 2010).

2010b: Y. N. Esin, Проблемы выделения изображений афанасьевской культуры в наскальном искусстве Минусинской котловины. In: N. F. Stepanova / A. V. Poljakov (eds), Афанасьевский сборник (Barnaul 2010) 53–73.

2015: Y. N. Esin, Миниатюрные изображения из рога окуневского могильника Итколь-II в контексте искусства скифо-сакского круга. In: A. A. Tishkin (ed.), Археология Западной Сибири и Алтая: опыт междисциплинарных исследований (Barnaul 2010) 386–391.

Esin/Polyakov 2025: Y. N. Esin / A. V. Polyakov, Жертвоприношение быка в окуневской культуре Южной Сибири. In: V. I. Molodin / A. V. Polyakov (eds), Окуневский сборник 3 (Sankt-Peterburg 2025) 193–218.

Esin et al. 2012: Y. N. Esin / J. Magail / Ch. Eruul-Erdene / J.-O. Gantulga, К проблеме выделения наскального искусства афанасьевской культуры Монголии: новые материалы и подходы. In: V. A. Alekshin et al. (eds), Культуры степной Евразии и их взаимодействие с древними цивилизациями 1 (Sankt-Peterburg 2012) 205–211.

Francfort 1994: H.-P. Francfort, The Central Asian dimension of the symbolic system in Bactria and Margiana. Antiquity 68, 1994, 406–418.

Gersmann/Grimm 2018: K.-H. Gersmann / O. Grimm (eds), Raptor and Human – Falconry and Bird Symbolism throughout the Millennia on a Global Scale. Publication in Considerable Extension of the Workshop at the Centre for Baltic and Scandinavian Archaeology (ZBSA) in Schleswig, March 5th to 7th 2014. Advanced Stud. Arch. Hist. Hunting 1 (Kiel, Hamburg 2018).

2024: K.-H. Gersmann / O. Grimm, On falconry and the question of its single or multiple invention. In: J. Schneeweiß / M. Nawroth / H. Piezonka / H. Schwarzberg (eds), Man sieht nur, was man weiß. Man weiß nur, was man sieht: Globalhistorische Perspektiven auf interkulturelle Phänomene der Mobilität. Festschrift H. Parzinger zum 65. Geburtstag. Prähist. Arch. Südosteuropa 33 (Rahden/Westf. 2024) 625–637.

Görke/Kozal 2018: S. Görke / E. Kozal, Birds of prey in pre-Hittite and Hittite Anatolia (c. 1970–1180 BCE): textual evidence and image representation. In: Gersmann/Grimm 2018, 1667–1689.

Grimm 2020: O. Grimm (ed., in cooperation with K.-H. Gersmann and A.-L. Tropato), Raptor on the Fist – Falconry, its Imagery and Similar Motifs throughout the Millennia on a Global Scale. Publication in Considerable Extension of a Conference at the New York University Abu Dhabi (NYUAD) in the United Arab Emirates, March 5th to 8th 2018 Advanced Stud. Arch. Hist. Hunting 2 = Advanced Stud. Ancient Iconography 2 (Kiel, Hamburg 2020).

Grimm/Gersmann 2018: O. Grimm / K.-H. Gersmann, Introduction, discussion and summary: raptor and human – falconry and bird symbolism throughout the millennia on a global scale. In: Gersmann/Grimm 2018, 18–25.

Hermann 2016: L. Hermann, Наскальное искусство местности Аккайнар. In: A. Saduakasuly / B. A. Bajtnaev / B. A. Zhelesnyakov (eds), Древности Жетысу. Памятники археологии Жамбылского района (Almaty 2016) 52–72.

van den Hout 2018: T. van den Hout, The Silver Stag Vessel: A Royal Gift. Metropolitan Mus. Journal 53, 2018, 114–127.

Jacobson-Tepfer et al. 2010: E. Jacobson-Tepfer / J. Meacham / G. Tepfer, Archaeology and Landscape in the Mongolian Altai: an Atlas (Redlands 2010).

Jeong et al. 2020: C. Jeong / K. Wang / S. Wilkin / W. T. T. Taylor / B. K. Miller / S. Ulziibayar / R. Stahl / Ch. Chiovelli / J. H. Bemmann / F. Knolle / N. Kradin / B. F. Bazarov / D. A. Miyagashev / P. B. Konovalov / E. Zhambaltarova / A. Ventresca Miller / W. Haak / S. Schiffels / J. Krause / N. Boivin / E. Myagmar / J. Hendy / C. Warinner, A dynamic 6,000-year genetic history of Eurasia's Eastern Steppe. Cell 183(4), 2020, 890–904.

Kalieva 2013: S. Kalieva, Die Tersek-Kultur. In: T. Stöllner / Z. Samašev (eds), Unbekanntes Kasachstan: Archäologie im Herzen Asiens 1 (Bochum 2013) 135–145.

Kiryushin 2019: K. Yu. Kiryushin, Энеолит Кулундинской степи. In: A. A. Tishkin (ed.), История Алтая 1: Древнейшая Эпоха, Древность и Средневековье (Barnaul 2019) 107–114.

Kiryushin et al. 2010: Yu. F. Kiryushin / S. P. Grushin / A. A. Tishkin, Березовая Лука – поселение эпохи бронзы в Алейской степи II (Barnaul 2010).

Komissarov 1996: S. A. Komissarov, Сяньбэй – »племя единорога«. In: A. I. Buraev et al. (eds), 100 лет гуннской археологии. Номадизм: прошлое, настоящее в глобальном контексте и исторической перспективе. Тезисы докладов международной конференции 1 (Ulan-Ude 1996) 31–33.

Kosintsev/Nekrasov 2018: P. Kosentsev / A. Nekrasov, An archaeozoological survey of remains of birds of prey in the West Eurasian Steppe. In: Gersmann/Grimm 2018, 565–578.

Kovalev/Munkhbayar 2015: A. A. Kovalev / Ch. Munkhbayar, Чемурчекский ритуальный комплекс Хар Чулуут 1 в истоках реки Ховд (Кобдо) (предварительное сообщение). In: A. A. Kovalev (ed.), Древнейшие европейцы в сердце Азии: чемурчекский культурный феномен II (Sankt-Peterburg 2015) 155–214.

Kubarev 2002: V. D. Kubarev, Образ птицы в петроглифах Алтая. In: Yu. F. Kiryushin / A. A. Tishkin (eds), Северная Евразия в эпоху бронзы: пространство, время, культура (Barnaul 2002) 77–81.

2009: V. D. Kubarev, Памятники каракольской культуры (Novosibirsk 2009).

Kubarev/Zabelin 2006: V. D. Kubatev / V. I. Zabelin, Авифауна Центральной Азии по древним рисункам и археолого-этнографическим источникам. Арх., этногр. и антр. Евразии 2(26), 2006, 87–103.

Leont'ev 2003: S. N. Leont'ev, Керамика эпохи неолита и энеолита Минусинской степи в собрании Мартьяновского музея. In: V. V. Bobrov / I. D. Rusakova (eds), Сборник научных трудов, посвящённый 70-летию со дня рождения А.И. Мартынова. Археология Южной Сибири 22 (Novosibirsk 2003) 42–48.

Leont'ev et al. 2006: N. V. Leont'ev / V. F. Kapel'ko / Y. N. Esin, Изваяния и стелы окуневской культуры (Abakan 2006).

Lipskii/Vadetskaya 2006a: A. N. Lipskii / E. B. Vadetskaya, Афанасьевские и окуневские погребения в могильнике Бельтыры. In: D. G. Savinov / M. L. Podol'skij (eds), Окуневский сборник 2: Культура и ее окружение (Sankt-Peterburg 2006) 73–81.

2006b: A. N. Lipskii / E. B. Vadetskaya, Могильник Тас Хазаа. In: D. G. Savinov / M. L. Podol'skij (eds), Окуневский сборник 2: Культура и ее окружение (Sankt-Peterburg 2006) 9–52.

Masson 1959: V. M. Masson, Древние земледельцы на юге Туркменистана (Ashkhabad 1959).

Masson/Merpert 1982: V. M. Masson / N. Ya. Merpert (eds), Энеолит СССР (Moskva 1982).

Masson/Sarianidi 1972: V. M. Masson / V. I. Sarianidi, Каракумы: заря цивилизации (Moskva 1972).

Matyushchenko 1963: V. I. Matyushchenko, Яйский неолитический могильник. In: S. S. Grigorzevich (ed.), Сборник научных работ исторических кафедр 165 (Tomsk 1963) 97–103.

Matyushchenko/Sinitsyna 1988: V. I. Matyushchenko / G. V. Sinitsyna, Могильник у деревни Ростовка вблизи Омска (Tomsk 1988).

Miklashevich/Solodeinikov 2013: E. A. Miklashevich / A. K. Solodeinikov, Новые возможности документирования наскальных изображений, выполненных краской (на примере Кавказской писаницы в Минусинской котловине). Научное обозрение Саяно-Алтая 1(5), 2013, 176–191.

Molodin 1996: V. I. Molodin, Наскальные изображения афанасьевской культуры (к постановке проблемы). Новейшие археологические и этнографические открытия в Сибири 2, 1996, 178–181.

2024: V. I. Molodin, Персонажи »калгутинского« стиля. Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий. Материалы итоговой сессии Института археологии и этнографии СО РАН 30, 2024, 193–199.

Monna et al. 2022: F. Monna / T. Rolland / J. Magail / Y. Esin / B. Bohard / A.-C. Allard / J. Wilczek / C. Chateau-Smith, ERA: A new, fast, machine learning-based

software to document rock paintings. Journal Cultural Heritage 58, 2022, 91–101.

Murgabaev/Maldybekova 2021: S. S. Murgabaev / L. D. Maldybekova, Древнейшие памятники наскального искусства хребта Каратау: петроглифы Карасуйир. Научное обозрение Саяно-Алтая 1(29), 2021, 2–8.

Nagler 2020: A. Nagler, The burial of birds of prey in kurgan Arzhan 2 (Tuva, southern Siberia, Russian Federation, 7th century BC) and its meaning. In: Grimm 2020, 327–336.

Nagler/Parzinger 2006: A. Nagler / G. Parzinger, Новые памятники окуневской культуры в центральной части Минусинской котловины. In: D. G. Savinov / M. L. Podol'skij (eds), Окуневский сборник 2: Культура и ее окружение (Sankt-Peterburg 2006) 104–119.

Omarov et al. 2024: G. Omarov / B. Besetayev / B. Zharylgassynova / M. Shagirbayev / R. Zhumatayev, At the beginning of the Saka era: comprehensive research in the Bozai 1 burial ground (East Kazakhstan). Kazakhstan Arch. 4(26), 2024, 181–206.

Os'kin 1976: A. V. Os'kin, Петроглифы Букантау. Природа 10, 1976, 83–89.

von der Osten-Sacken 2020: E. von der Osten-Sacken, Decorative raptors, protective raptors. Bird talon amulets and other forms of apotropaic use of birds of prey in the ancient Near East from the Epipalaeolithic to the Neo-Assyrian period (c. 20,000–500 BC). In: Grimm 2020, 287–325.

Pan et al. 2020: Pan Ling / Tian Likun / Liu Ning / Li Xinquan (eds), Xifeng Xichagou – Xi Han shiqi dongbei minzu mudi [Xichagou in Xifeng – The cemetery of the north-eastern peoples of the Western Han] (Beijing 2020).

Pankina/Ermakov 2020: A. I. Pankina / T. K Ermakov, Опыт культурно-хронологической и видовой атрибуции орнитомофного образа с Шалаболинской писаницы. Universum Humanitarium 1, 2020, 144–161.

Parikh 2020: R. Parikh, »The King's Boon Companion«: Falconry in Mughal Imperial Portraiture from Akbar to Azam Shah, 1556–1707. In: Grimm 2020, 929–944.

Perrot/Madjidzadeh 2003: J. Perrot / Y. Madjidzadeh, Découvertes récentes à Jiroft (Sud du plateau iranien). Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres 147(3), 2003, 1087–1102.

Pittman/Aruz 1987: H. Pittman / J. Aruz, Ancient Art in miniature: Near Eastern Seals from the Collection of Martin and Sarah Cherkasky (New York 1987).

Pokrovsky 2018: I. Pokrovsky, Stable isotope analysis in raptor and falconry studies. In: Gersmann/Grimm 2018, 423–430.

Polyakov/Esin 2015: A. V. Polyakov / Y. N. Esin, Horn figurines from an Okunev burial on Lake Itkul, Khakassia, Southern Siberia. Arch., Ethn. and Anthr. Eurasia 43(2), 2015, 43–57.

Potapov 1957: R. L. Potapov, К истории фауны Центральной Азии (о наскальных изображениях животных в Туве). In: S. P. Tolstov et al. (eds), Сборник Музея антропологии и этнографии XVII (Leningrad 1957) 429–431.

Prummel 2018: W. Prummel, The archaeological-archaeozoological identification of falconry – methodological remarks and some Dutch examples. In: Gersmann/Grimm 2018, 467–478.

Reiter 2018a: K. Reiter, Falconry in the Ancient Orient? I. A contribution to the history of falconry. In: Gersmann/Grimm 2018, 1631–1642.

2018b: K. Reiter, Falconry in the Ancient Orient? II. The Sources. In: Gersmann/Grimm 2018, 1643–1658.

2018c: K. Reiter, Falconry in Ugarit. In: Gersmann/Grimm 2018, 1659–1666.

Rozwadovski 2004: A. Rozwadovski, Symbols through Time. Interpreting the Rock Art of Central Asia (Poznan 2004).

Samashev et al. 2007: Z. Samashev / K. Kusherbaev / E. Amanshaev / A. Astaf'ev, Сокровища Устюрта и Манкыстау (Almaty 2007).

Sarianidi 1994: V. I. Sarianidi, Preface. In: F. F. Hiebert, Origins of the Bronze Age Oasis Civilisation in Central Asia. Am. School Prehist. Research Bull. 42 (Cambridge 1994).

1998: V. I. Sarianidi, Myths of Ancient Bactria and Margiana on its Seals and Amulets (Moscow 1998).

Sarianidi et al. 2020: V. I. Sarianidi / N. A. Dubova / K. S. Samurskii, Сокровища древней Маргианы. Фотоальбом (Moskva 2020).

Sodnomjamts/Batbold 2024: D. Sodnomjamts / N. Batbold, Khoroon oroi uulyn khadny zurag dakhi shuvuuny dürslel. Stud. Arch. XLIV, 2024, 84–91. (in Mongolian)

Soma 2015: T. Soma, Human and Raptor Interactions in the Context of a Nomadic Society: Anthropological and Ethno-Ornithological Studies of Altaic Kazakh Falconry and its Cultural Sustainability in Western Mongolia (Kassel 2015).

Strassberg 2002: R. E. Strassberg, A Chinese Bestiary: Strange Creatures from the Guideways Through Mountains and Seas (Berkeley et al. 2002).

Streck 2014-2016: M. P. Streck (ed.), Reallexikon der Assyriologie und Vorderasiatischen Archäologie 14 (Berlin, Boston 2014–2016).

Töpfer et al. 2023: T. Töpfer / C. Franken / H. Rohland / R. Hutterer / U. Erdenebat / T. Batbayar, A Gyrfalcon *Falco rusticolus* from an Uyghur well in Karabalgasun (Ordu-Baliq), Central Mongolia. Journal Global Arch. 4, 2023, 138–161.

Tseveendorj 2005: D. Tseveedorj, Petroglify Aral Tolgoi. In: D. Tseveendorj / V. D. Kubarev / E. Jakobson, Aral tolgoin khadny zurag (Ulaanbaatar 2005) 69–79. (in Mongolian)

Wallace 2018: L. Wallace, The early history of falconry in China (2nd to 5th centuries AD) and the question of its origins. In: Gersmann/Grimm 2018, 1847–1864.

Wang et al. 2023: Y. Wang / F. Monteith / T. Xi / M. Ren / D. Li / S. Hu / J. Wang / M. Festa / J. Ma, New evidence for regional pastoral practice and social complexity in the Eastern Tianshan Mountains in the first millennium BCE. Scien. Reports 13, 2023, 4338. DOI: 10.1038/s41598-023-31489-9.

Warburton 2018: D. A. Warburton, Egypt and earlier: birds of prey in the human mind at the dawn of history. In: Gersmann/Grimm 2018, 325–346.

2020: D. A. Warburton, Birds of prey and religion: aspects of the first 40,000 years of early bird-and-human contact. In: Grimm 2020, 85–110.

Winkelmann 2013: S. Winkelmann, Transformation of Near Eastern animal motifs in Murghabo-Bactrian Bronze Age art. In: A. Peruzzetto / F. D. Metzger / L. Dirven (eds), Animals, Gods and Men from East to West. Papers on Archaeology and History in Honour of Roberta Venco Ricciardi. BAR Internat. Ser. 2516 (Oxford 2013) 47–64.

Yablonsky 2018: L. Yablonsky, Were the early Sarmatian nomads falconers in the southern Urals, Russia, during the 4th century BC? In: Gersmann/Grimm 2018, 579–586.

Zabelin 2010: V. I. Zabelin, Формирование фауны птиц Алтае-Саянской области: эколого-эволюционные аспекты [Автореферат дисс. доктора биологических наук / autoreferat habil. diss. Tomsk State Univ. 2010].

Zheleznyakov 2019: B. A. Zheleznyakov, Образ птиц на скалах Жетысу: к постановке проблемы. Археология Казахстана 1(3), 2019, 73–82.

Zhou 1991: Zhou Xinghua, Zhongwei yanhua [Petroglyphs of Zhongwei] (Yinchuan 1991). (in Chinese).

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Human-Animal Studies are gaining more and more momentum in archaeo(zoo)logy for good reasons - it is time to have yet another look at animal-human relations that is less anthropocentric than it was before. Such an approach could come in different forms: from the study of single species and their relation to humans to a so-called multispecies archaeology. However, it could also include imaginary animals, such as dragons and unicorns, or half-animal, half-human beings. The present book is to be understood as a small contribution to Human-Animal Studies in archaeo(zoo)logy and also as a first step towards a multispecies archaeology, being a broader look on different species, including non-human and human actors but, for the time being, excluding plants. With some alterations, the present publication goes back to a session at the Annual Meeting of the European Association of Archaeologists (EAA) in Kiel (Germany) in September 2021 entitled »Beast and Human«. As it has turned out, the given lectures and papers can be arranged in a manner that they constitute a narrative which ranges, geographically, from the United Kingdom to Russia and, chronologically, from the late hunter-gatherer period to early modern times.

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